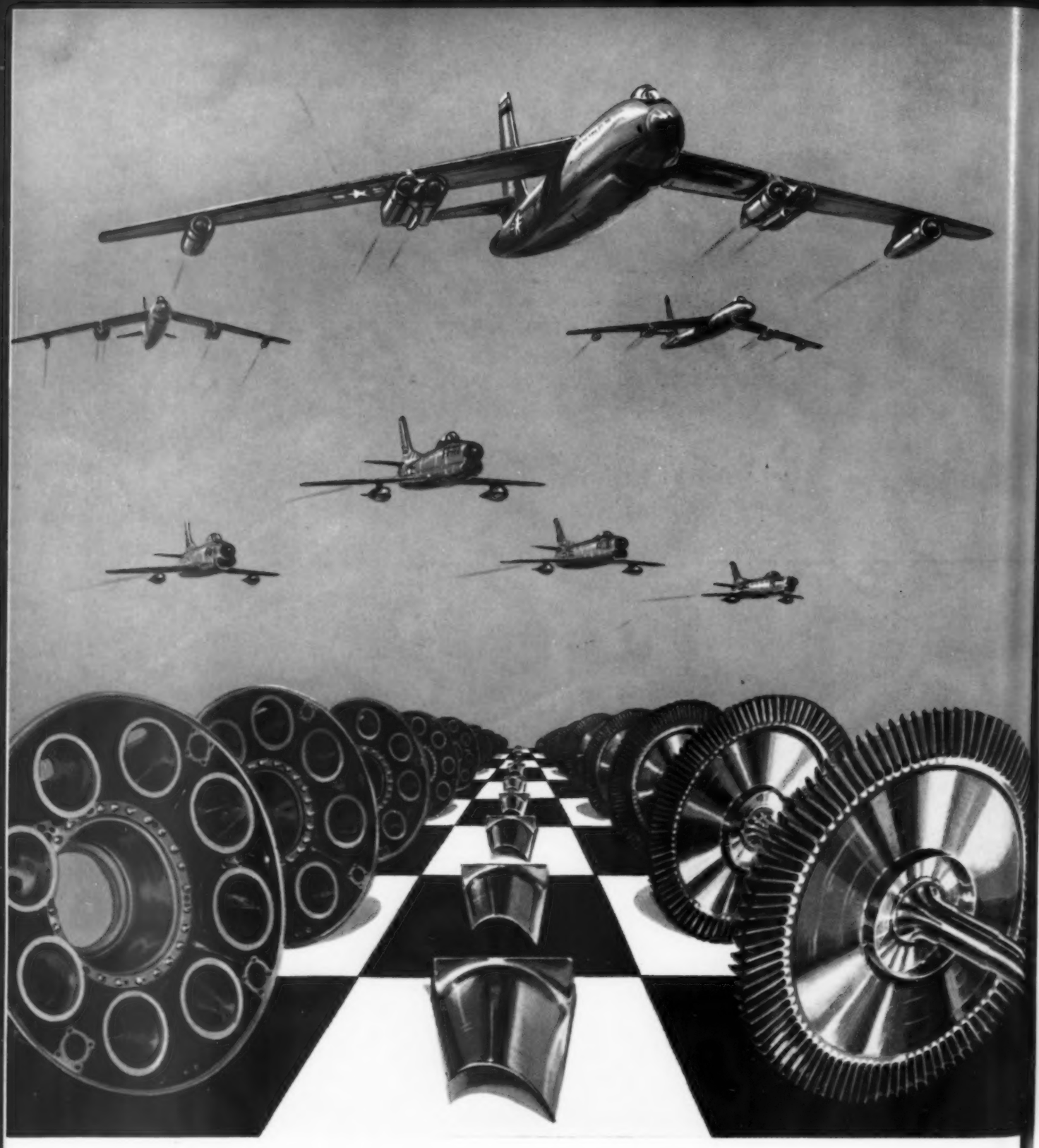
FLIGHT

MAGAZINE

APRIL 1957
50 cents

TECHNOLOGY DEPT.

WIDE-WING 560E AERO COMMANDER



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ENGINE DIVISION • DEER PARK, L. I.

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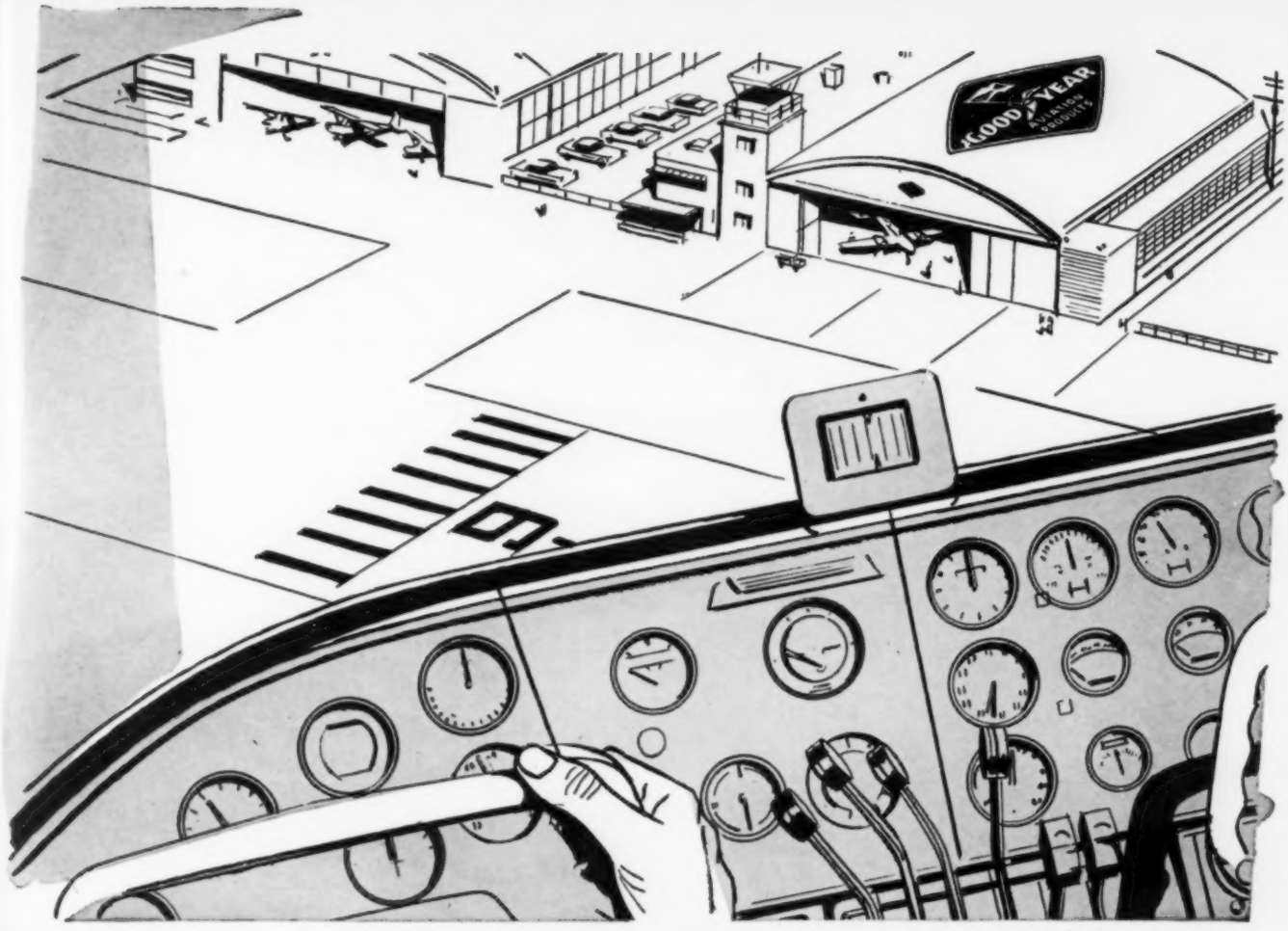

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And there's another welcome sign here, too–the Goodyear "Sign of Service."

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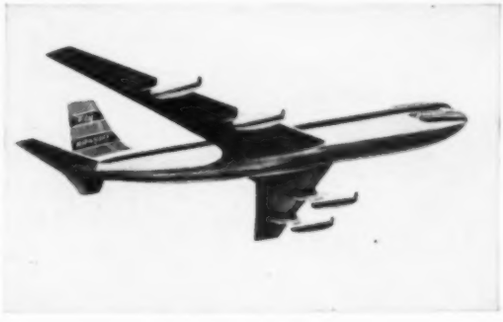
One in a series about users of Phillips 66 Aviation Products

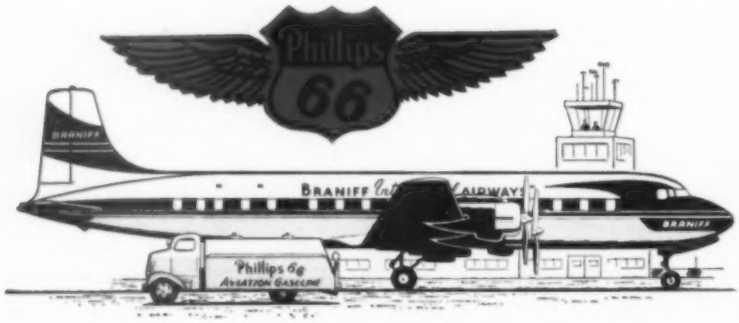
Phillips 66 LOOKS AHEAD with BRANIFF

Improved service for today and in the future is the goal of Braniff International Airways' $83 million aircraft expansion program. Recently, Braniff placed the new DC-7C "El Dorado" in domestic service and plans to put these 350-mile-an-hour liners into international service in 1957. In addition, Braniff has ordered 9 Lockheed Electra Turbo props for delivery in 1959 and five Boeing 707 jet transports for delivery in 1959 and 1960.

The new "El Dorado" has an operational non-stop capacity of more than 5,000 miles. Reduction of noise and vibration, weather mapping radar and combination first class-air coach service are features of the new "El Dorado".



Braniff's new 707 jet transports will permit these typical flying schedules: Dallas-Chicago, 1 hr., 38 min.; Houston-Chicago, 1 hr., 53 min.; Fort Worth-Washington, D. C., 2 hr., 15 min.; Dallas-New York, 2 hr., 36 min.



● Today, Phillips 66 Aviation Gasoline gives dependable, efficient performance to Braniff and other leading air lines, as well as to the military air services.

In step with the future, Phillips is a leading producer of *super performance* Jet Fuels for the latest designs in turbo-props and jets. And Phillips research continues to lead the way for development of fuels for the aircraft of tomorrow.

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AIR Report

Significant Trends and News

LOCKHEED HAS CONFIRMED REPORTS it is constructing a multi-jet, 2-crew, 10-passenger utility transport for military consideration and possible commercial marketing, if sufficient military sales are negotiated, "We intend to explore thoroughly the commercial potential of such a plane," said Courtlandt S. Gross, Lockheed president. He said he was impressed by business flying's spectacular growth, with 20,000 private planes now used by companies outnumbering the entire fleet of airliners by 15 to 1 — Gross said 90 of the nation's 100 largest corporations operate one or more airplanes. He gave no details of the Lockheed prototype, but said it will fly next September, its performance approaching that of 575-615-mph. jet airliners.

NEW BUSINESS PLANE DELIVERIES TOTALED 1,006 AIRCRAFT during January-February, with $16,774,000 in billings, according to the Utility Airplane Council of the Aircraft Industries Association. Joe Geuting of UAC said new figures showed business flying during 1956 logged an estimated 5,000,000 flying hours — 56% more time in the sky than registered by the nation's scheduled airlines. The January-February new plane deliveries by nine companies were as follows: Aero Commander 27; Beech 127; Call Air 4; Cessna 390; Champion 13; Mooney 13; Piper 432 and Taylorcraft 2.

CARL B. WOOTTEN, long-time business plane sales executive who developed Aero Commander sales into a multi-million-dollar backlog in less than 6 years, has been named executive vice president of Trecker Aircraft Corp., Milwaukee, manufacturers of the Super 200 Royal Gull amphibian. Trecker also has named Earle W. Barry, formerly a sales executive with Aviquipo, New York export firm, as vice president in charge of Royal Gull sales in Latin America. He has opened Trecker's export office in the New York City area.

TACAN DATA LINK has been developed by Federal Telecommunications Laboratories of International Telephone and Telegraph Corp., as an added feature of the Tacan system which is being integrated with the commercial omni navigation system to form "Vortac" as the new U. S. common navigation system. Tacan Data Link, which features automatic reporting by push-button use of 31 code messages, is provided by adding a "small black box" to Tacan or Vortac-equipped aircraft — no new radio equipment is needed. Two revolutionary new panel instruments enable the pilot and ground controller to exchange messages on routine matters through a unique push-button arrangement. Should the controller want the pilot to let "wheels down," "hold," or "proceed," for example, he pushes an appropriate button and the order appears in word form on the pilot's panel. The pilot exchanges routine messages in the same manner. Federal says Tacan Data Link can handle the most complex traffic situations with ease, since the exchange of full data on identification, speed, course, altitude and position for 120 aircraft can take place in only 6 seconds.

CAA WILL INSTITUTE CONTROL OF ALL INSTRUMENT AIR TRAFFIC ABOVE 24,000 FEET by mid-summer, more than tripling the square miles of controlled air space. At present, instrument traffic is controlled regardless of altitude only when moving along 90,000 miles of designated airways. In January, 1958, CAA will lower the floor of the all-airspace IFR control area to 15,000 ft.

COLONIAL AIRCRAFT HAS DELIVERED ITS 18th SKIMMER C-1 AMPHIBIAN to Surinam Timber Development Co., Dutch Guiana, through Aircraft Sales & Brokerage of Long Beach, Calif., according to David B. Thurston, president of the Sanford, Maine, manufacturing company.

ON MARK ENGINEERING COMPANY, which remanufactures Douglas B-26 and other military aircraft for civilian use and produces quick-disconnect aircraft couplings, has moved its operations from Grand

FLIGHT MAGAZINE

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THIS MONTH'S COVER shows the new wide-wing Aero Commander 560E. The 210-mph. 5-7-place business twin is powered by two 295-hp. Lycomings and has a 2,200-lb. useful load at a 6,500-lb. gross weight. Standard fuel capacity of 223 gals. gives it a 1,625-mile range with reserve. —(Aero Design Photo by Wayne Entriken.)

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New Business in the Hangar—NATIONWIDE ROUNDUP OF INTERESTING DEVELOPMENTS AT LEADING MODIFICATION CENTERS 50

GEORGE E. HADDAWAY, Editor-Publisher; TOM ASHLEY, Managing Editor; FRED N. STONES, JR., Business Manager; LOUISE ROBERTSON, Circulation; E. H. PICKERING, *Consultant*; P. O. Box 750 (2700 N. Haskell Ave.), Dallas, Texas—Telephone TAylor 3-6191.

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Designed for Water Work Without Conversion Limitations

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ADDITIONAL INFORMATION AVAILABLE FROM

COLONIAL AIRCRAFT CORPORATION
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Central Airport in Glendale, California, to San Fernando Valley Airport at Van Nuys. With 35,000 sq. ft. of hangar, warehouse, shop and office space, the new quarters cost $500,000, according to Robert O. Denny, president. On Mark has 404 ft. fronting on the airport.

AIRPLANE OWNERS can now obtain general maintenance inspection aids and alert bulletins from the CAA by subscribing for them from the Superintendent of Documents for $1.50 per year. The monthly-issued aids deal with general aircraft service experience, compiled from industry-supplied information contained in malfunction and defects reports to CAA. The alert bulletins point to specific conditions requiring emergency action by owners and repair stations.

DONALD V. EDWARDS has joined the Friendship F-27 and jet M-185 customer relations staff of the Fairchild Engine and Airplane Corp., according to James Pfeiffer, executive director. He was formerly with Frontier Airlines at Denver in several positions, including chief engineer.

TACTAIR T-3 AUTOPILOT PRODUCTION has reached a rate of 50 units a month at Tactair, Inc., division of Aircraft Products Co., Bridgeport, Pa. The firm has appointed 18 distributors to handle sales and service of the pneumatic autopilot. They include Aircraftco, Inc., Wichita; Atlantic Aviation, East Boston and Teterboro; Atlantic Aviation Service, Wilmington; Beckett Aviation, Pittsburgh; Butler Airplane Sales, Chicago; Currey Sanders Aircraft, Shreveport; Cutter-Carr Flying Service, Albuquerque; Flightcraft, Portland, Oregon; Gray Air-

FOUR-ENGINE SAFETY for staff transportation in the new West German air force is represented by this British-built de Havilland Heron. The 8-place executive transport version of the light transport is powered by four small 250-hp. de Havilland engines and cruises at 183 mph. Note Maltese cross insignia.

THE NOSE THAT KNOWS THE WEATHER

...and makes possible a faster, more comfortable trip!

That plastic "nose" you see encloses the business end of RCA's new weather avoidance radar (AVQ-50).

Specially developed for use in aircraft where weight, space and power are at a premium, the AVQ-50 is the latest addition to the RCA weather radar family.

It enables your pilot to pinpoint turbulent areas many miles ahead and choose a smooth path around them. In the words of a pilot, it makes it possible to do broken field running instead of long, time-wasting end runs. It is also good for ground-mapping.

In the interest of timesaving and more comfortable flying, you should investigate the AVQ-50 as applied to your aircraft.

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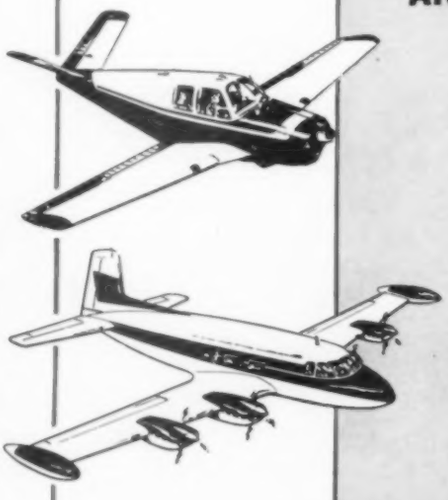

AND REMEMBER:

Continental's Engine Remanufacturing Service gives you a new factory-remanufactured engine — back to zero hours and with factory new engine guarantee—at a low fixed cost, with virtually no dead time. . . . Ask your Continental Motors service station about this Continental-pioneered program which boosts the utility of aircraft—stimulates their wider use.

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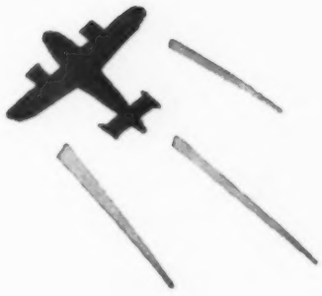
craft Service, Dallas; Gopher Aviation, Rochester, Minn.; Lang, Omaha; Norman Larson, Van Nuys; Ohio Aviation, Vandalia; Pacific Aircraft Sales, Oakland; Page Airways, Rochester, N. Y.; Topeka Aircraft Sales, Topeka, and Tradewind Airport, Amarillo.

HILLER HELICOPTERS has a new $4,795,872 contract for an undisclosed quantity of improved H-23D Army helicopters for training and reconnaissance. The H-23D has a new transmission and drive system designed for 1,000-hr. service between overhauls, a 250-hp. Lycoming engine and re-designed tail rotor assembly.

SIX LOCAL SERVICE AIRLINES which recently pulled out of the Conference of Local Service Airlines have organized their own trade association, retaining Col. Joseph P. Adams, former CAB vice chairman, as their permanent counsel. Adams will serve as interim executive director until a full-time director is selected. Nick Bez, president of West Coast Airlines, and Gwin Hicks, president of Lake Central Airlines, were named chairman and vice chairman. Other carriers in the group are Bonanza, Central, Ozark and Frontier. Hawaiian Airlines was represented, as was Trans-Pacific Airlines, at their meeting.

LLOYD AVIATION OF DES MOINES has been named Cessna distributor for 73 Iowa counties. It is a new firm which recently purchased assets of American Aviation from George Hanson, with Richard Lloyd as president and general manager and his brother, Robert, as secretary-treasurer. Their father, J. A. Lloyd, is vice president. Richard Lloyd form-

STABLE MABEL is Kellett Aircraft's name for its one-man rocket-powered helicopter for Navy and Army research with Kellett's new gyro-stabilizing development. Mabel, which grosses 640 lbs. at more than twice its 230-lb. empty weight, is pictured at Fairmount Park in the heart of Philadelphia. Note vapor trails of rocket engines located in rotor tips.



SMALL TOWNS OR BIG CITIES *Esso is there...at 600 airports from Maine to Texas!* You just can't beat those Esso Aviation Dealers for prompt and courteous service. (And, as you know, there are no better products than Esso fuels and lubricants!) With an Esso Credit Card, charge-account convenience is yours at *any* of the Esso Aviation Dealers. With it you can even charge tire and battery service, landing fees, overnight in-transit storage and most minor emergency repairs – as well as gasoline, oil and lubrication. Better get one! And, next time, put down where there is an Esso Aviation Dealer.

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ESSO

FIRST PHOTO OF NEW AIR FORCE F-105 SUPERSONIC FIGHTER-BOMBER indicates the stub-wing, needle-nosed craft has flat air intakes near cockpit. Engine is P & W J-75 with afterburner.

x-ray diagnosis

NEW LOW RATES

from piper cubs to DC-7's

at Aero of Atlanta!

CLASS	100 HOUR INSPECTION, INCLUDING X-RAY INSPECTION	X-RAY PRICE	X-RAY NO. OF EXPOSURES
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CLASS V Douglas—DC-3 Lockheed—Lodestar Grumman Mallard Consolidated PBY	$995	$495	50
CLASS VI Douglas—A20, A26, B23 Lockheed—PV-1, SUPER PV Curtiss—C-46 North American—B-25 Martin—B-26	$1295	$495	50

WRITE FOR RATES ON OTHER PLANES NOT LISTED

AERO CORPORATION

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erly owned a construction firm at Minot, N. D.

A $3,830,000 MACH 5 WIND TUNNEL is being built by Chance Vought Aircraft at Dallas and will be ready by January, 1958, for testing with winds up to 3,800 mph.

THE CONVAIR 880 JET AIRLINER'S MAXIMUM CRUISING SPEED has been increased to 615 mph., its maximum allowable take-off weight has been increased to 178,500 lbs. with no change in empty weight, and its take-off distance has been shortened 5% as a result of a million-dollar wind tunnel testing program. First 880 is due to fly in late 1959 and deliveries to TWA, Delta and Transcontinental SA of South America are scheduled in time for service to begin in 1960. The 880 will be powered by a commercial version of the General Electric J79, which powers the supersonic Convair B-58 bomber.

SPERRY HAS DEVELOPED A REVOLUTIONARY NEW NAVIGATION SYSTEM for air and sea traffic. Called the hyperbolic CYTAC system, it requires only 15 ground transmitters to provide complete coverage of the United States and adjacent sea lanes and is said to be up to 10 times more accurate than present systems at equal ranges. Standard Loran receiver-indicators can be adapted for it but Sperry has developed a lightweight automatic airborne receiver for it which continuously supplies exact position.

CIVIL AERONAUTICS BOARD MEMBERS completed their series of visits to five aircraft manufacturers for the purpose of "jet age orientation" and issued a joint statement commending the manufacturers on their "realistic" approach to air transportation problems. "Our impression that America's aircraft builders are at the threshold of a new era in transportation is strengthened by what we saw," the statement declared. Individual statements by members indicated they were impressed by capabilities of the Fairchild F-27 turboprop as a DC-3 replacement for local service carriers. But they emphasized that their statements do not constitute prior approval of airline purchases. Equipment selection is a matter of managerial discretion.

SOUTHWEST AIRWAYS HAS ORDERED THREE FAIRCHILD F-27 FRIENDSHIP TURBOPROP TRANSPORTS, bringing to more than 60 the total number of the Fairchild transports on order, with options calling for 29 additional F-27's. The 40-passenger F-27, powered by Rolls-Royce Dart propjet engines, cruises at 280 mph. and is said to be suited for short-field requirements.

THE SUPERSONIC DE HAVILLAND GYRON TURBOJET ENGINE has completed its first development stage and is now being operated, with afterburning, at 25,000 lbs. static thrust. De Havilland says it is be-

PIPER DELIVERS 5,000th TRI-PACER

John Brittingham, Lambshead Ranch, Albany, Texas, owner of the 5000th Tri-Pacer.

THE 5,000TH PIPER TRI-PACER, delivered March 11, 1957, set a production record unmatched by any other plane in its class.

Behind this convincing proof of the flying public's preference for the Tri-Pacer is Piper's experience in building over 43,000 aircraft – more airplanes, by far, for business, industry and pleasure than any other manufacturer in the world has built.

The Tri-Pacer has opened a whole new era in business aircraft use by combining in a single airplane more features to simplify flying – tricycle gear, simplified, inter-connected controls – with four-place capacity and better than 130 mph cross-country performance.

Thoroughly proved and tested, and constantly improved in comfort, performance and reliability, the Tri-Pacer is today the logical choice for anyone in the market for a safe, comfortable, simple-to-fly airplane with top performance *at practical cost.* The 150 hp Tri-Pacer is faster, more powerful, than anything in its class, yet costs far less.

For details on this remarkable airplane, and a demonstration flight, see your Piper dealer or write for brochure to Dept. F-4, Piper Aircraft Corporation, Lock Haven, Pennsylvania.

ONLY $7,830 for the STANDARD TRI-PACER with 150 horsepower Lycoming engine.
SUPER CUSTOM TRI-PACER with full gyro panel, two radios, VHF transmitter, three radio navigation systems – Omni, LF range, and homing loop – priced at $9,430. Attractive time purchase plan.

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MORE PEOPLE HAVE BOUGHT PIPERS THAN ANY OTHER PLANE IN THE WORLD

TRANSVAL presents world's lightest 6 channel MHF Transmitter-Receiver

35 watts in a 12 lb. package!

The TRANSVAL MARK IV features transmitter, receiver, and power supply all in one short ½ ATR case, three times smaller than comparable radios now in use, and is the newest achievement of the TRANSVAL engineers. This lightweight Medium High Frequency unit is an important new contribution to aircraft communications and is an ultramodern rugged design from shock mounts up through the most advanced applications of airborne transistor circuitry.

The transistorized power supply eliminates the heavier, less dependable vibrator and dynamotor types of power source. The MARK IV is so constructed in its single, self-contained case that it may be installed in any convenient fuselage area and connected by a single electrical cable for remote operation from the cockpit. Now, neither weight nor space limitations—either in airliners or light private aircraft—need prevent the satisfaction of high-power, long-range, *dependable* MHF equipment. Designed to meet air carrier specifications, the MARK IV can be installed at a cost no greater than that of older, heavier, two-way units. It answers growing communications problems for any type aircraft operating over remote areas, mountainous terrain, or beyond land.

The Mark IV represents the most advanced use of transistor circuitry in airborne MHF equipment.

- **Frequency Range**
  2 mc to 10 mc, with 6 crystal controlled transmitting and 6 crystal controlled receiving channels.
- **Receiver Audio Output**
  10 watts.
- **Receiver Sensitivity**
  5 microvolts for 500 mw output.
- **Receiver Selectivity**
  10 kc at 6 db down.
- **Power Consumption**
  Receiver – 1.5 amps at 13.75 V
  Transmitter – 7.0 amps at 13.75 V
- **Control System**
  Electric Remote Controlled Frequency Selector and Volume Control.
- **Size**
  12¾" long, 5" wide, 7¾" high.
  Weight: less than 12 lbs.

Complete data covering the TRANSVAL MARK IV are available to aircraft owners, operators and manufacturers, upon request. Distributorships for the MARK IV and other TRANSVAL products are now being established throughout the United States.

For complete details, wire, write or phone VErmont 9-2301

TRANSVAL *Engineering Corporation*
Aircraft Radio Division
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lieved to be the world's most powerful jet.

SALES OF TRANSVAL ENGINEERING CORPORATION, which recently announced a new line of aircraft radio equipment, delivered shipments valued at $609,000 during the six months ended January 31, according to George K. Otis, president. The Culver City firm expects to top the $2,000,000 in 1957 sales and currently operates two plants.

A MAJOR PROGRAM OF RESEARCH INTO GIANT ALUMINUM AIRCRAFT HANGAR and airport service structures is being conducted by Harvey Aluminum Structures, a division of Harvey Machine Co., Torrance, Calif. Aluminum hangar roof framework weighs about one-seventh as much as steel for similar coverage.

INCREASED SERVICE BETWEEN OVERHAULS has been authorized by the Air Force for certain Vertol H-21 components. Transmissions were upped from 250 to 450 hrs., rotor blades from 450 to 750 hrs., rotor hubs from 200 to 450 hrs., rotor controls and swash plates from 250 to 450 hrs. The eventual goal is 1,000-hr. periods between overhauls for all components. Vertol H-21's have now accumulated close to 100,000 hours.

Airmen's Calendar

May 4-5—Missouri Pilots Association Convention, Springfield.

May 5-8—30th Annual Convention, American Association of Airport Executives, Shamrock Hilton Hotel, Houston. Contact Paul Koonce, General Chairman, Houston International Airport.

May 8-11—13th Annual American Helicopter Society National Forum, Sheraton-Park Hotel, Washington, D. C., Harry Lounsbury, Executive Secretary.

May 15-17—Jet Age Airport Conference, sponsored by Air Transport Division, American Society of Civil Engineers, Park-Sheraton Hotel, Washington, D. C.

May 26-June 2—Aviation Writers Association Convention, St. Louis.

June 1—8th Annual Maintenance and Operations Meeting, Reading Aviation Service, Municipal Airport, Reading, Pa.

June 1-9—First Annual National Aviation Trades Show and Exhibits, Monmouth County Airport, New Jersey.

June 7-9—Missouri Air Tour.

June 8-9—10th Annual Moonlight Flight, Porterville, California, Pilots Association.

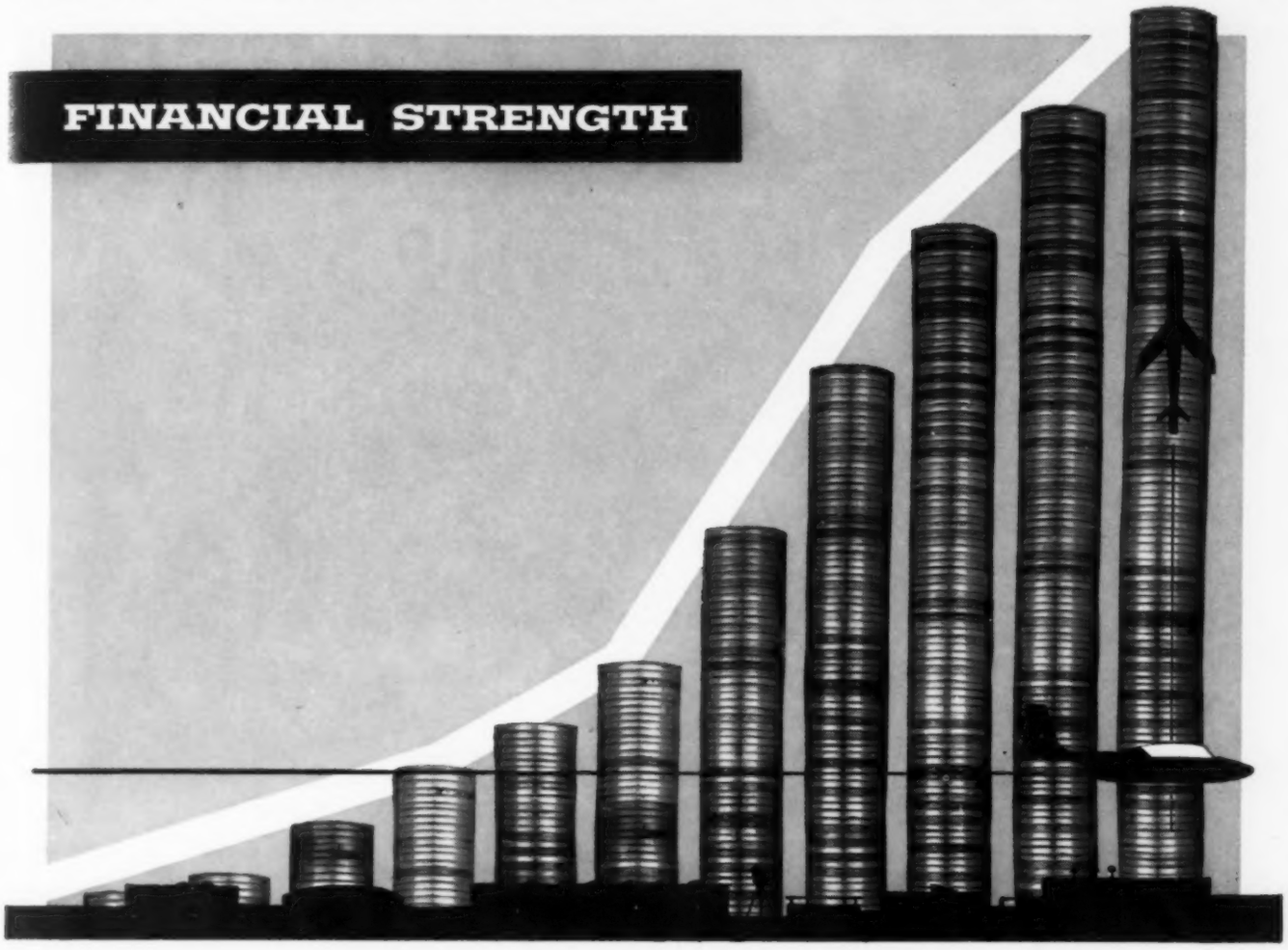
June 15—International Convention of the Ninety-Nines, Casa de Palmas Hotel, McAllen, Texas.

June 17—Ninety-Nines' International Air Race, McAllen, Texas-Cuba.

June 25—29th Aviation Distributors and Manufacturers Assn. Meeting, Broadmoor Hotel, Colorado Springs.

July 13-19—5th Annual Jaycee Air Cruise, Philadelphia to Las Vegas.

July 2—2nd Annual National Flying Club Convention, Denver, Colo.



At Temco GROWTH tells the story

Growth — in financial strength, for example, tells the Temco success story.

At the end of its first full year of operation, 1946, Temco's net worth was $23,042. Within five years, this figure was multiplied one hundredfold; and in 1955 — the company's 10th anniversary — its net worth had zoomed to $10,402,937. This year, as a result of steadily expanding facilities and new prime contracts climaxing the successful development of aircraft, missiles and weapons systems of its own design, Temco's financial stfength will set an impressive new record.

For the engineer who sets his sights high, Temco's increasing financial strength means the prestige of a soundly established company, plus the opportunity that only a vigorous, growing organization can offer. Here's your opportunity to match your stride to a company that's going places — fast!

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A single Allison J71 Turbo-Jet, producing more than 10,000 pounds thrust, gives the Demon speeds of over 600 mph to engage enemy aircraft at high altitude. Allison engines are designed and built by America's pioneer producer of turbine aircraft engines.

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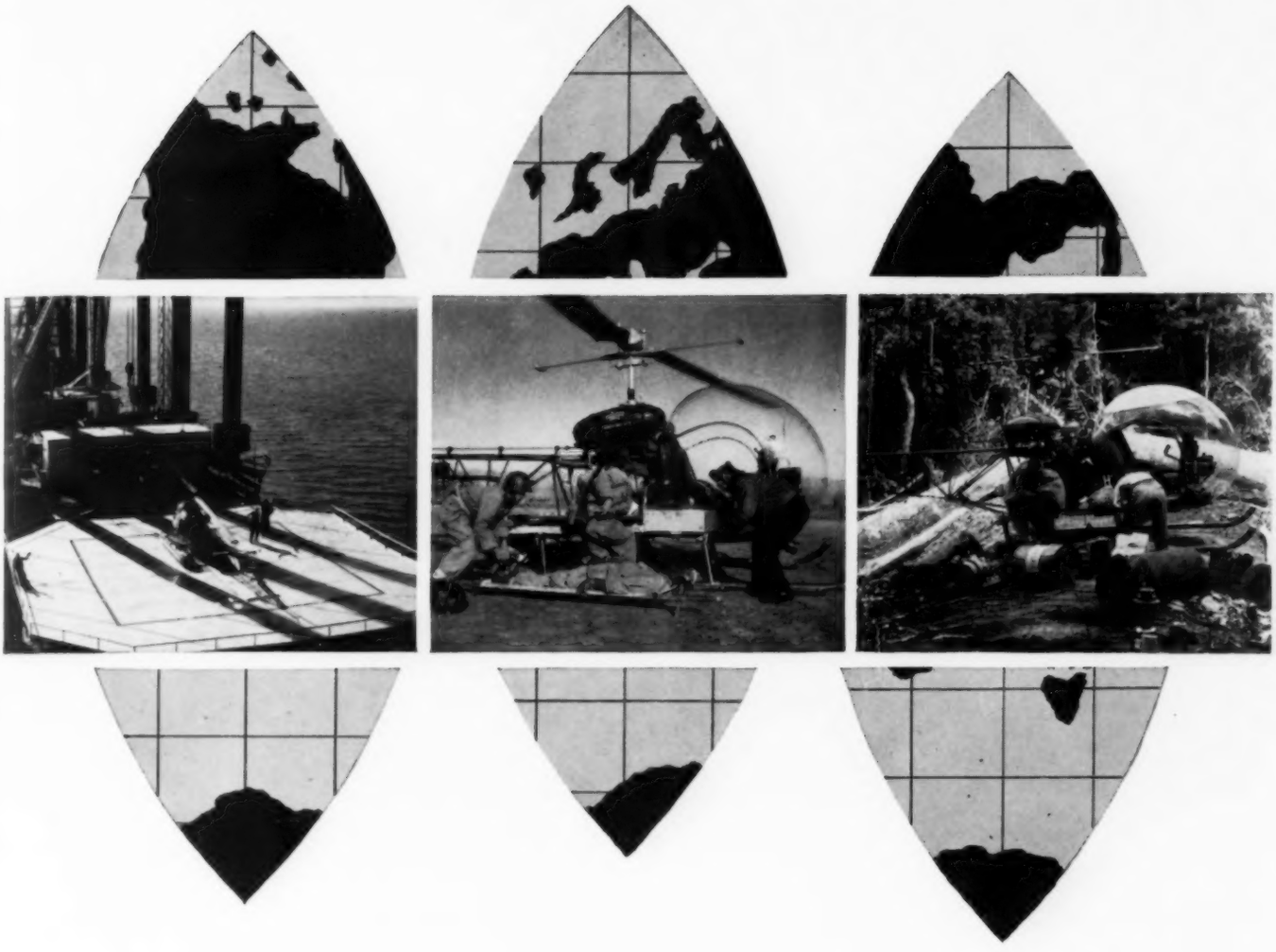

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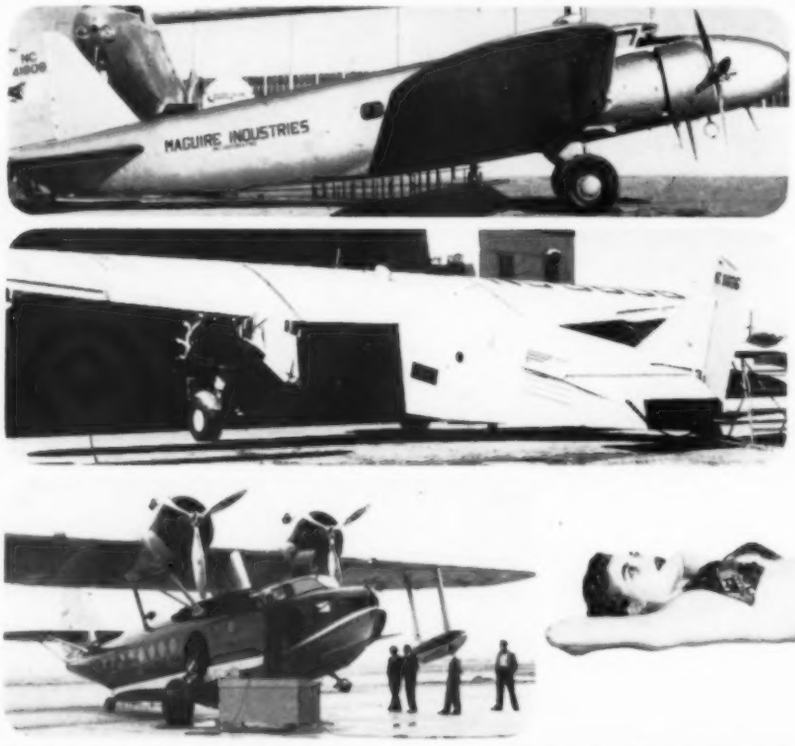
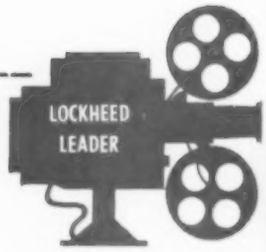
SAC Silver Jubilee Newsreel

BY JACK PATTON

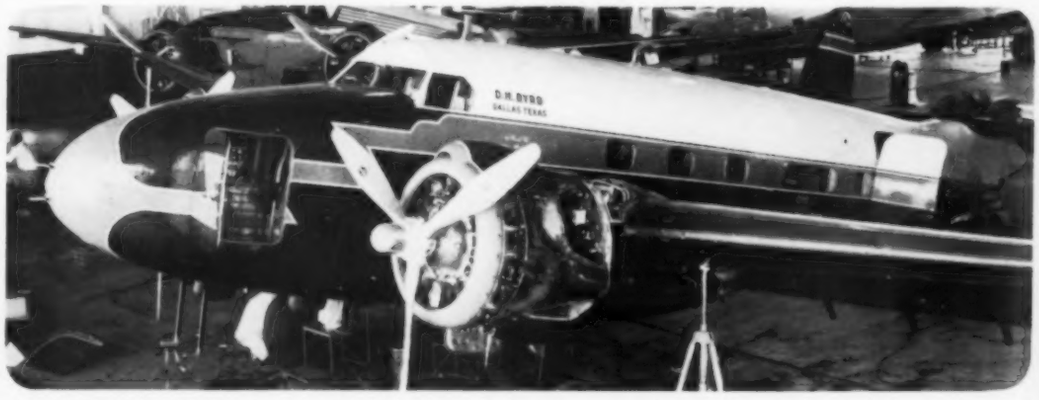
PLANE PEOPLE
FILLERUP ?
PILOTS ARE TOO SKINNY
WHERE ARE THE PISTONS ?
'36---REFUELLER KILLY KILLINGSWORTH, EX-DIETICIAN LORRAINE SANDERS, ENGINEMAN LOUIS BEIMER START HERE.
AHA---PI OVER X PLUS Y EQUALS SERVICE!
'37 WINSTON CASTLEBERRY JOINED FIRM, RECOMMENDED MORE EMPHASIS ON SERVICE.
CAN YOU BUILD 'EM, TOO ?
DUNNO - NEVER TRIED!
'39-'40..FIRST IN U.S. AS AUTHORIZED LOCKHEED SERVICE STATION.
RECKON IT'LL SPIN?
I'M SICK!
AMONG LOCKHEED 10 OWNERS WAS DOCTOR WHOSE PILOT ALSO CREWED HIS YACHT.

Southwest Airmotive was among the few companies in America providing complete service for business flying's first "big uns", like (top to bottom) the Boeing 247, Tri-Motor Ford, and Sikorsky amphibian.





A look at the records shows that SAC has pioneered more important Lockheed business aircraft modifications than any single firm in America. Besides being tops with other types, we're still No. 1 as a leader in Lockheeds.



1932 — A QUARTER CENTURY OF LEADERSHIP — 1957

Southwest Airmotive Co.
LOVE FIELD DALLAS
DIVISIONS: KANSAS CITY, KANSAS / DENVER, COLORADO

Just among ourselves

No Hangars From SBA

SEVERAL months ago the Small Business Administration, in cahoots with the CAA and an aviation trade association, issued a statement that SBA money would be made available on a loan basis to fixed-base operators for new hangar construction. There was great rejoicing by operators and aircraft owners alike because the hangar shortage is critical and banks have been reluctant to lend money on buildings going up on leased ground, or to small aviation enterprises on any basis.

The SBA deal has turned out to be a mirage. Hardly any loans have been consummated. It now comes to light that SBA "will not make loans solely for the purpose of construction of hangars for rental purposes." This is because it is considered that such use of SBA funds would be an investment in rental property and, therefore, not eligible for loan.

There goes 80 per cent of the market for new hangars! If you don't intend to run a shop, or install a restaurant, open up a store or operate some kind of business in the building other than space rental, you can't qualify!

Even with such "small business operations" in the building we have learned that an operator has to mortgage collateral to SBA at least equal to the amount being borrowed and that with an excellent financial statement, some operators might get a 50 per cent loan on the cost of the building!

It's about time the CAA or SBA or somebody gets out a new release to offset the malarky dispatched in the original last December. About the only benefit to come from this phoney announcement is a reminder that if it can't be done by private enterprise it better not be done at all. The less we have to do with government financing the better, whether it be hogs, hairpins or hangars.

Good Deal For All

THE growing use of commercial aviation facilities under contract by the military in engine, airplane and accessory overhaul holds tremendous significance for commercial aviation and for the lowly taxpayer as well. The remarkable on-time performance of the first jet engine overhaul contract the Air Force awarded to Southwest Airmotive means that other commercial companies will receive similar contracts. Nearly 50 per cent of all Air Force modification and modernization work is now in commercial hands. And in the past few months the Army, Navy and Air Force have expanded contract flight training with commercial institutions through the Air ROTC program.

It should be pointed out that there is no charity involved in the military's dispensing work contracts to commercial institutions. It's simply good business. There is a critical shortage of career technicians in the military services. In addition the very nature of traditional military procedure always has been and always will be far more costly unit-by-unit and man-hour-by-man-hour in comparison with commercial operations. Now on the threshold of a new economy wave, a new period of "austerity", the military services will be forced by necessity to turn more and more to commercial operations for overhaul and modernization work. Fortunately we have the establishments that can superimpose such work on their commercial business.

The trend in this direction speaks highly of U. S. commercial aviation enterprise. With flying equipment becoming more and more complex, with greater speeds imposing more critical operating conditions, quality and precision workmanship become even more important. Right here is where civil aviation enterprise really shines! Just ask any military quality control people assigned to the various operations where contract work is being done.

Many non-published cost analyses have been made in recent years to determine cost comparisons between the military doing their own work and contracting it out to commercial enterprise. This research has finally paid off — with growing military contracts. It's one of those situations where everybody wins — the military gets the highest quality work at the lowest possible cost, the commercial aviation enterprise makes a profit and the taxpayers save money. There is of course a definite limit to the type and volume of military work that can be put on contract. What's important is the fact that the military has finally come around to the realization that commercial aviation enterprise can do many jobs far better and for less money than they can do themselves. It not only speaks well for our military leadership but also for the capabilities of the American aviation industry.

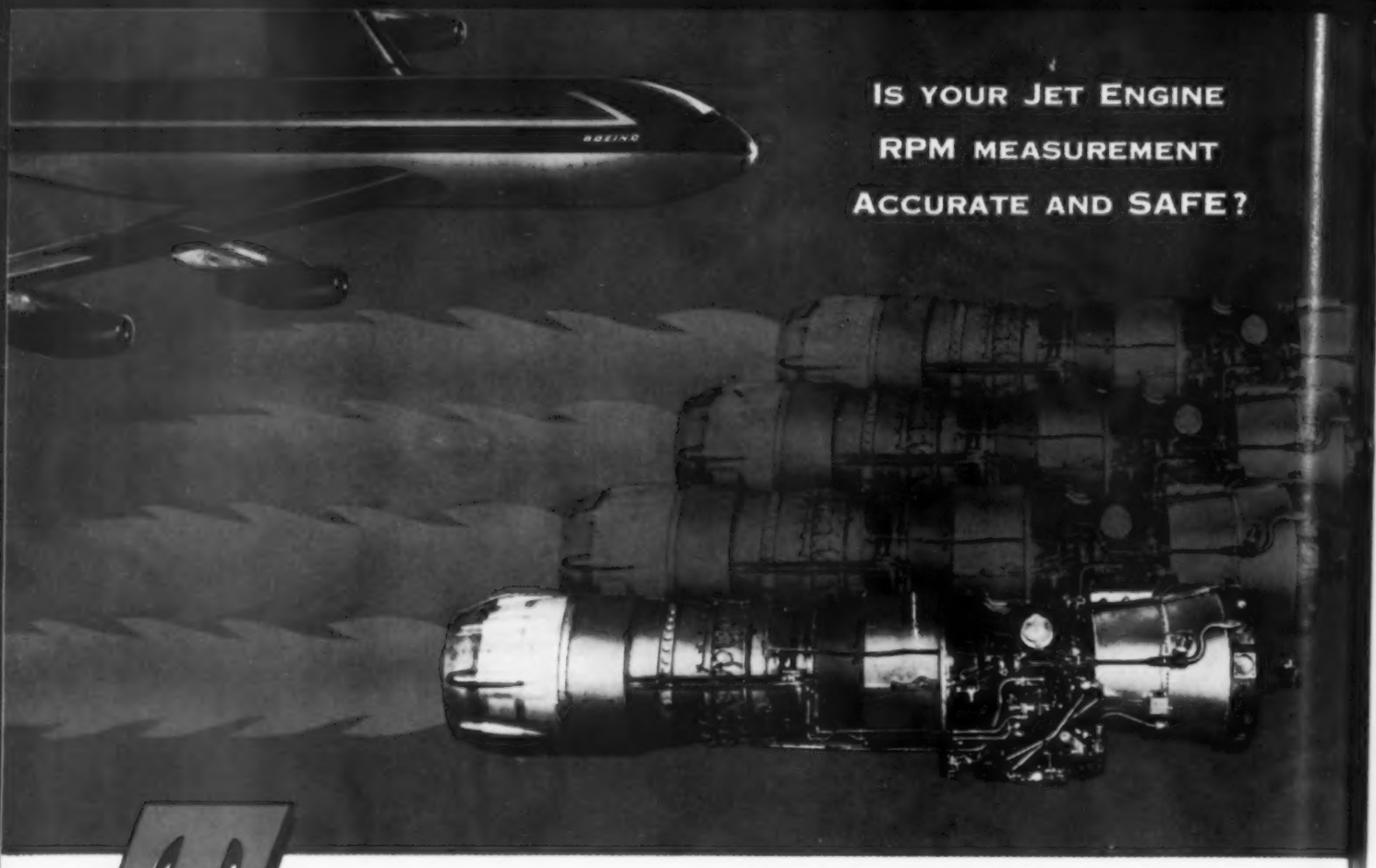
The President's Helicopters

PRESIDENT Eisenhower was justifiably irked by a silly, insulting question put to him during a late March press conference by a reporter representing the Chicago Daily News who asked the President if, in the interest of cutting the budget, he could give up the two helicopters that would transport him to the golf course.

The question was rude, facetious and completely assinine, a new low in American journalism.

Even if the two Bell helicopters had been purchased to transport the President to a golf course, so what? The President of the United States is one of the most important men on earth and should have at his beck and call any kind of conveyance he needs to get anywhere. The helicopters were acquired to facilitate short hops for the President such as between the White House and the airport. No small part of the decision to utilize helicopters (along with automobiles, the Aero Commander, naval ships and the

(Continued on page 47)



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The TAKCAL's component parts are identical with those used in the J-Model JETCAL Analyzer. They are here assembled as a separate unit tester and for use with all earlier models of the JETCAL Tester.

The TAKCAL operates accurately in all ambient temperatures from −40°F. to 140°F. Low in cost for an instrument of such extreme accuracy, it is adaptable to application in many other fields.

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Regulus II

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Details of the new missile are classified. But with weapons like Vought's *Regulus II* now in the air, Americans can be sure that U. S. Missile Power is the world's best. For both today and tomorrow, this ready power stands as a strong force for peace and as a mighty deterrent to aggression throughout the world's explosive trouble spots.

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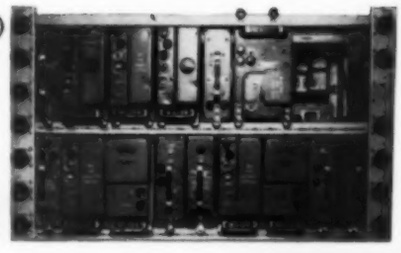

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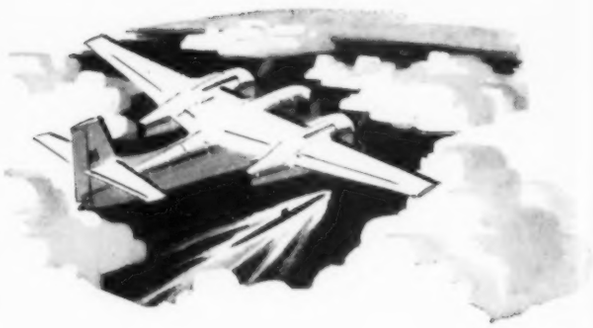

CYCLONE 9s add to the striking power of Royal Canadian Navy's GRUMMAN CS2F-1

A highly effective sub-hunter, the new De Havilland-built Grumman CS2F-1—serving the Naval Air Branch of the Royal Canadian Navy—is a deadly sub-killer too. Using radar to detect and track subs on the surface, and magnetic airborne detection (MAD) to zero on submerged craft, the CS2F-1 patrols the seas off Canada with an arsenal of torpedoes, depth charges and mines.

Every bit as important as the firepower of this new tracker is its engine power – twin Cyclone 9s by Curtiss-Wright. These modern powerplants, with the longest service background of any aircraft engine type, give the Grumman CS2F-1 its far-reaching overwater capabilities, its hour-after-hour dependability, its fuel economy for maximum patrol endurance and range.

Sub-detection is a vital part of a chain-reaction "offshore patrol" that day and night guards North America, and whose perimeter extends from the Arctic Ocean south around the entire continent. Everywhere in this protective network Curtiss-Wright power plays a leading role.

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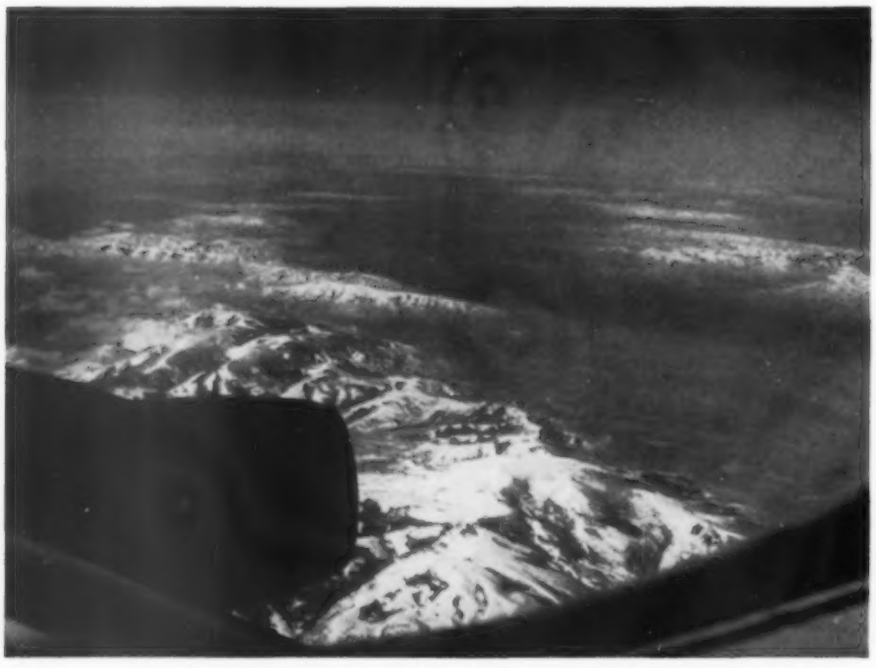
Boeing 707 prototype of 575-mph. jet airliners to be delivered beginning late in 1958 is a picture of aerodynamic cleanness and speed. Wings, swept back 35 degrees, contain over 12,000 gals. of fuel for over 5 hrs. of cruising in prototype. Device on No. 1 engine is an experimental sound suppressor. —(Boeing Photo.)

Preview of Jet Travel in Boeing 707

BY TOM ASHLEY

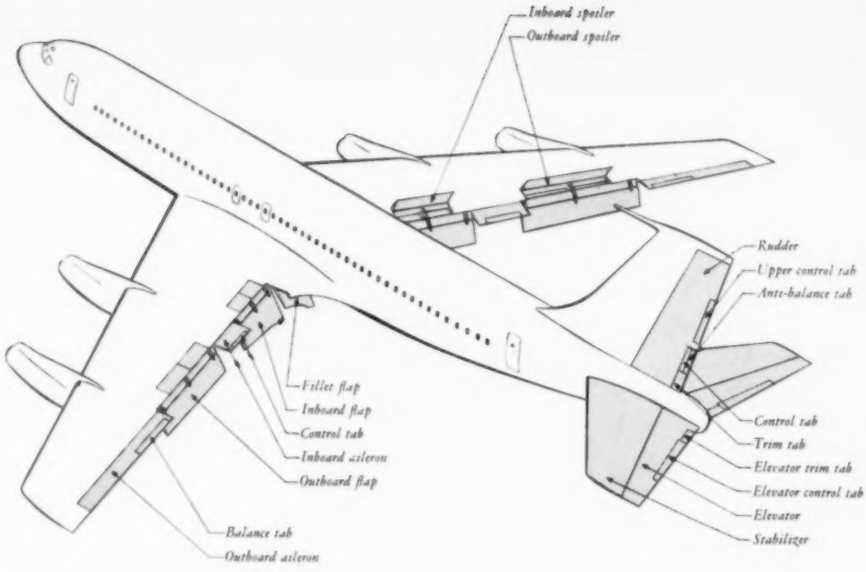
BOEING Airplane Company's chief of flight test, A. M. (Tex) Johnston, who once instructed at Kansas City, barnstormed in a Ford tri-motor which he looped and won the 1946 Thompson Trophy race in a Bell P-39, broke the transcontinental speed record for transports last month by flying the Boeing 707 jet airliner prototype 2,350 miles from Seattle to Baltimore in 3 hrs. 48 mins., averaging 612 mph. block to block. He barnstormed the 707 back to Seattle, stopping at Chicago to pick up some writers, including us, and at Denver to pick up some airline customers, including Bob Six, who has ordered four 707's for Continental Air Lines. It was slower going home against headwinds and instrument approaches at Denver and Chicago slowed the 707 even more. But even so, Tex averaged 540 mph. for the 4,921-mile circuit.

Our trip in the 707 was a fairly realistic preview of jet airliner transportation as it will be in mid-1959 after Pan American World Airways



This is what we saw from the 707 above the Rocky Mountains between Denver and Ogden, Utah. Angle of inboard nacelle shows 707 was climbing when picture made at 30,000 ft. Horizon here is about 200 miles away. —(FLIGHT MAGAZINE Photo.)

The 707 has a manual control system for flight surfaces, the pilot operating trailing tabs which actuate ailerons, elevators and rudder. Small inboard ailerons are used at ordinary and high speeds, large outboard ailerons only for very slow speeds with flaps or in high cross-winds along runway. Spoilers are used differentially with ailerons for maneuvering, in unison as speed brakes and to shorten landing roll after nose-wheel is on, their application transferring 85% of aircraft weight to the main gear for most effective wheel braking. Note multiplicity of small cabin windows, front and rear cabin doors. Prod atop fin is antenna.



and American Airlines inaugurate the first jet schedules. The prototype we traveled in was not as plush, not as heavy and not as powerful as the production 707's will be, however. Its four Pratt & Whitney J-57 jet engines were early versions, rated at 9,600 lbs. thrust each, while J-57's ordered by airlines will be rated at 12,000 lbs. thrust each and some 13,000 lbs. each with water injection for take-off in hot weather. The prototype's gross has been 190,000 lbs., but the smallest of four airline versions will gross more than 240,000 lbs. J-57's will power only a few of the airliners, most being ordered with more powerful J-75's of undisclosed ratings.

In the prototype, our take-off from Chicago was at 178,000 lbs. for gross weight. But Tex, who waited for speed to build up to 155 mph., used up 6,200 ft. of runway before lifting it off into the cool air, temperature being under 50 degrees F. He called it "rotating the nose upward" when he hauled back on the wheel.

Once off at 135 knots, it took only 20 seconds to accelerate to 300 knots, which is the 707's best climbing speed. But instead of going on up, Tex bent the 707 around to Midway Airport in answer to the tower's request for a fly-by at the world's busiest airport. Famous as the 707 test pilot, with something like 710 hrs. logged in two and a half years of flight testing it, and every bit as much of a sales pilot, Tex gave the Midway tower all they asked for and then some. This is a suggestion to other towers which may come within reach of Tex on his forthcoming tours — don't fail to request a fly-by; Tex'll be glad to comply, and you'll see something surprising.

Pulling out of our Midway fly-by, we began our climb at better than 4,000 fpm. and 300 knots and leveled off at 31,000 ft. 17 mins. later. The power setting for cruising was 7,600 rpm., with the air speed indicator showing 310 knots and the Mach meter showing .85 for a true air speed of 570-575 mph. at that altitude and minus 35-degree F. temperature. The fuel flow meters showed slightly over 3,000 lbs. per hr. per engine for a 4-engine fuel consumption of better than 1,850 gals. per hr. Cabin pressurization gave us a cabin altitude of only 6,700 ft.

This was really moving — a dream in a hurry, revolutionizing air travel with speeds and comforts which have to be experienced to be appreciated. We had been to 19,000 and 20,000 ft. in Cessna 310's, 21,000 in DC-6's and even 22,000 in Aero Commanders, but this was our first look at 31,000

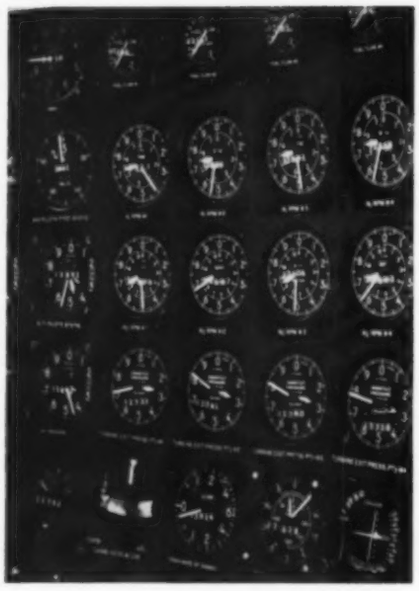
Personable Tex Johnston, Boeing chief of flight test who has conducted most of 707 test flying, is pictured below. We shot ramp portrait of the 707 at Denver to show large size of the 190,000-lb. prototype. Smallest of three airline versions will gross over 120 tons and will carry 50 tons of fuel, consuming it at an average rate of about 1,900 gals. per hr. including taxi, take-off, climb, cruise, letdown, approach and landing.

ft. Later, we got up to 35,000 in the 707. What impressed us was that we were comfortable and it was quiet. Not as quiet as some people have said. But quieter than any airplane in our experience. All we could hear was a faint suggestion of jet power, without any whine, beat or vibration, and the sound of the wind rushing past the sealed cabin. This is called "aerodynamic noise" in the jet age. It sounds like a very distant waterfall, is pleasing and does not fatigue. We once heard something similar with both engines feathered on an Aero Commander at 20,000 ft., nosing down to hold 110 mph. IAS in a 1,000-fpm. glide.

In the rear of the 707, behind the tailpipes, we could hear much more power noise. But it was about like the normal cabin noise in a DC-6, except that it lacked the objectionable beat and vibration of piston-engine noise.

Looking out, we noted the sky was bluer than when viewed from lower levels, completely lacking in haze, and the sunlight was brighter, casting sharper shadows inside and on the wing. At night, the stars would be more numerous and brighter than ever. The horizon we estimated to be at least 200 miles away. Down below, ordinary terrain features were reduced to nothingness, only the more prominent rivers, peaks and cities emerging from the earth's vast sameness. We thought we detected some curvature in the horizon.

Everything was wonderful — except the knowledge that any winds encountered would be headwinds from the west. They were between 90 and 115 mph., the checkpoints showed. This, though, was but a 900-mile hop and headwinds aren't much of an obstacle when you're knocking off close to 10 miles per minute with twice the fuel you need. Slower airplanes could never afford such luxury. There was one far below us — a DC-7 which had departed Chicago 20 minutes ahead of us. We passed him just out of Omaha.



Instruments show in-flight 580-mph. 707 prototype performance. Mach meter at top left shows speed of .85 while air speed indicator below it indicates 300 knots at 34,000 ft. (altimeter is fourth dial down from top at left). Small fuel flow meters across top show 3,000 lbs. per hr. Below them are eight turbine speed dials indicating between 7,400 and 7,700 rpm. Manifold pressure gauges below rpm. dials show turbine exit pressures. Climb indicator is for cabin altitude. These instruments were on a duplicate engineering panel being recorded by movie cameras throughout the trip.
—(FLIGHT MAGAZINE Photo.)

Oncoming clouds below hid the Rockies as we approached Denver and Tex began letting down into them 20 mins. out, about 175 miles from the city. We covered the 900-mile distance from Chicago in 1 hr. 51 mins. for 487 mph. but Denver was in a snowstorm and an instrument approach delayed our landing for 17 minutes.

It was a revelation to watch Tex slow the 707 down to ordinary DC-6 pattern speed of 140 knots for his instrument approach. He described the jet as an excellent instrument airplane as he brought it over the fence and landed at 122 knots in the snowstorm, which cut visibility down to one mile.

The 707 has small, inboard ailerons for control at ordinary and high speeds and large, outboard ailerons for very slow speeds and precision handling on the runway in high cross-winds. It also has spoilers on each wing, used differentially with ailerons for maneuvering or in unison as speed brakes in steep descents. As soon as the nosewheel was on, Tex popped the spoilers and this transferred 85% of the aircraft weight from the wing to the landing gear for effective wheel braking. Our landing roll was less than 4,500 ft.

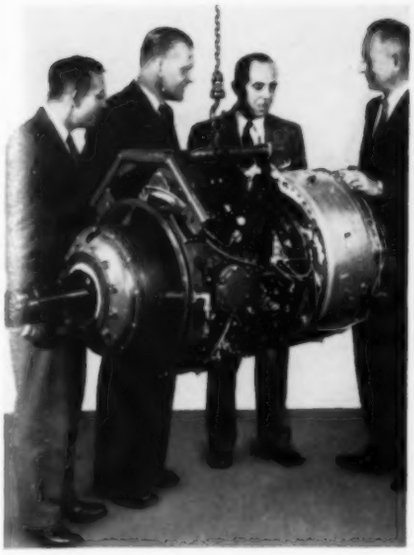
The 707 main gear's huge tandem trucks retract into the fuselage to leave the wing free for maximum fuel storage. Thus the gear has been given great structural trussing, so much that it can be extended at speeds above 300 knots for use as an air brake in rapid descents on the order of 16,000 ft. per min. in case of emergencies above 20,000 ft. The gear has a disadvantage in that turbulence in the wheel bays is the source of cabin noise when the wheels are extended.

Quiet as the passenger cabin is, jet noise is objectionable to people on the ground — probably much more so than aircraftsmen realize. The Port of New York Authority has consistently banned all jet flights from New York airline airports — until exhaust noise suppression is effective. Boeing says it has been experimenting with suppression for some time, has achieved 12 to 15% noise reduction and will reduce the 707 exhaust noise to a point comparable to that of current piston-engine air transports at a 2% power penalty. The suppressor works on the principle of altering the frequency of exhaust noise. It is also being perfected to provide thrust reversal for braking.

In flight-testing, one such suppressor was installed on the No. 1 (left outboard) jet and the 707 flown across the airport at 1,000-ft. altitude, the other three engines being shut down.

(Continued on page 70)

Boeing is already in quantity production on KC-135 jet tankers, which are almost identical to 707 airliners. First 707 won't be delivered until December, 1958. First four KC-135's have already been delivered and we saw many more at Boeing's Renton plant in Seattle.
—(Boeing Photo.)



Lycoming turbine expert Anselm Franz (right) and his staff engineers, Heinz Moellman, Seigfried Decher and Wolfgang Stein with their new T55.

1,650-ESHP Lycoming T55

LYCOMING Division of Avco Manufacturing Corp., Stratford, Connecticut, has developed a small aircraft turbine rated at more than 1,650 equivalent shaft horsepower but weighing only 665 lbs. as a turboprop engine and only 600 lbs. as a helicopter engine.

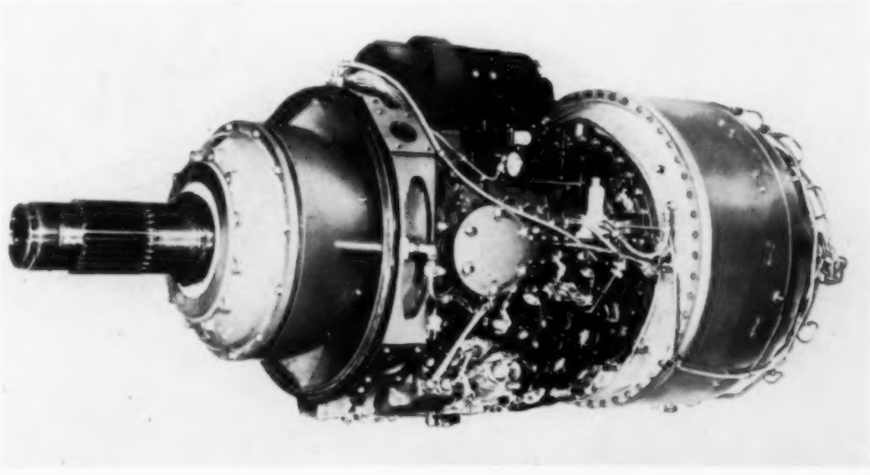
It is the new T55, called the most powerful free-power turbine for aircraft ever developed in America and the lightest aircraft engine ever to achieve more than 1,650 eshp.

Under the free-power turbine principle, the power turbine and its associated shafting and reduction gearing are mechanically independent of the compressor and its turbine.

Specifications are as follows:

	Turbo-prop	Heli-copter
Equiv. take-off shaft hp.	1,651	1,676
Max. Cont. eshp.	1,383	1,392
Equiv. take-off spec. fuel consumption, lbs.-eshp.-hr.	.657	.648
Max. cont. spec. fuel consumption, lbs.-eshp.-hr.	.688	.685
Weight, lbs.	665	600
Diameter, ins.	24.25	24.25
Length, ins.	58.8	44
Nom. Output shaft speed, rpm.	1,200	6,000

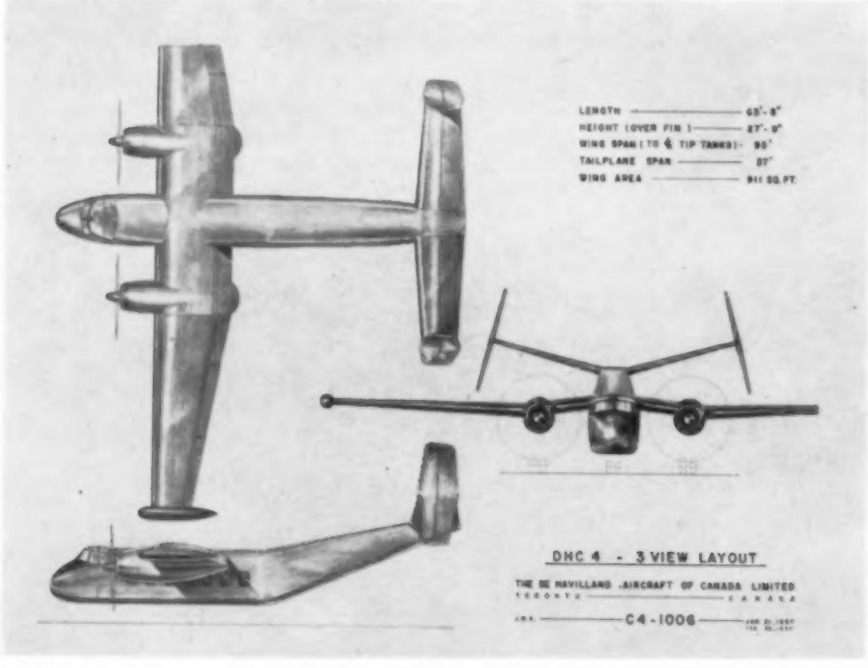
A workhorse engine, the T55 is shown above on a test stand and uncowled below. It has combination axial-centrifugal compressor and single-stage compressor turbine independent of two-stage power turbine. Turboprop version weighs 665 lbs., helicopter version 600 lbs.



Here's the de Havilland DHC4 Caribou. At 24,000-lb. gross, it will take off and land over 50-ft. obstacles from improvised strips only 800 ft. long while carrying DC-3 loads. It will land at 59 mph., cruise 185 mph. on 51% of power from 1,450- hp. engines. U. S. Army has ordered 5 Caribous.

The Amazing New De Havilland Caribou

A WORKHORSE twin-engine transport with phenomenal short-field performance and DC-3 payload capabilities is being constructed by de Havilland Aircraft of Canada at Toronto and the U. S. Army is purchasing five of the new-type transports through a Canadian Department of Defense Production order valued at approximately $2,500,000.


LENGTH — 65'-8"
HEIGHT (OVER FIN) — 27'-9"
WING SPAN (TO ℄ TIP TANKS) — 93'
TAILPLANE SPAN — 27'
WING AREA — 911 SQ.FT.
DHC 4 - 3 VIEW LAYOUT
THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED
TORONTO — CANADA
C4-1006

The new de Havilland is the DHC4 Caribou and the first airplane will be completed in time for first flights during the summer of 1958.

It will have a useful load of 9,500 lbs. at a gross weight of 24,000 lbs. and will be powered by two Pratt & Whitney R-2000-D5 engines rated at 1,450 hp. each for take-off and at 1,200 hp. each for maximum continuous operation. These are the engines which powered the Douglas C-54-DC-4 series and give the DHC4 a power loading of only 8.24 lbs. per hp. for STOL (for short take-off and landing) performance from short, improvised fields.

As heavy as it is, the Caribou is described by de Havilland as having the ability to take off at gross weight, at sea level, and with a 10-mile wind, in the very short distance of only 330 ft. It will clear a 50-ft. obstacle within a mere 650 ft. from a dead start. With zero wind, the figures are still phenomenal, being only 450 and 800 ft., respectively.

Landing distances for it are even shorter, being only 230 ft. for ground roll and just 550 ft. to a stop after clearing a 50-ft. obstacle.

It will climb at a rate of 1,580 ft. at sea level and will have a single-

engine rate of climb of 420 ft. at sea level and 380 fpm. at an elevation of 5,000 ft. Service ceiling is 26,000 ft., with a single-engine service ceiling of 13,000 ft.

These performance figures far exceed the capabilities of the DC-3 — and the Caribou has the DC-3's load-carrying ability. It is basically an all-weather utility transport, for 27-passenger seating or 28 combat troops using folding seats or for cargo payloads varying from 6,000 lbs. with fuel for 600 miles up to 7,320 lbs. with 200-mile range. Maximum range is 1,200 miles.

The Caribou's primary purpose is to serve as an army air vehicle for maximum mobility of troops, equipment and supplies in forward battle areas and as a commercial air transport for low-cost passenger and cargo service in undeveloped areas. It is designed to operate independently of established airport facilities and to land or take off from improvised strips as short as 800 ft. in length.

Its clear, unobstructed cabin has direct access through large, rear-loading doors beneath the high tail. An adjustable loading ramp and freight winching facilities provide for rapid loading and the level cabin floor, measuring 73.5 inches wide by 23 ft. long, is only 42 inches off the ground. Interior cabin height is 87 ins. and cabin width at elbow height is 83 inches. Total cabin volume is 1,052 cu. ft.

The de Havilland company estimates total direct operating costs of the Caribou to be $99.37 per hour, or about 18.7 cents per ton-mile.

Cruising speed is listed at 185 mph. at 7,500 ft. using 51% horsepower or 750 hp. from each engine.

The Caribou will be the largest airplane operated by the U. S. Army, which is limited by the Department of Defense to a maximum empty weight considerably below that of the DHC4. However, a special exemption was authorized for the Army to acquire the Caribou.

Performance claims for the Caribou are based on de Havilland experience with two widely-successful single-engine workplanes, the L-20 Beaver and the U1-A Otter, large fleets of which are in U. S. Army operation. The Otter carries 9 to 11 fully-equipped combat troops or 2,500 lbs.

(Continued on page 70)

De Havilland DHC-4

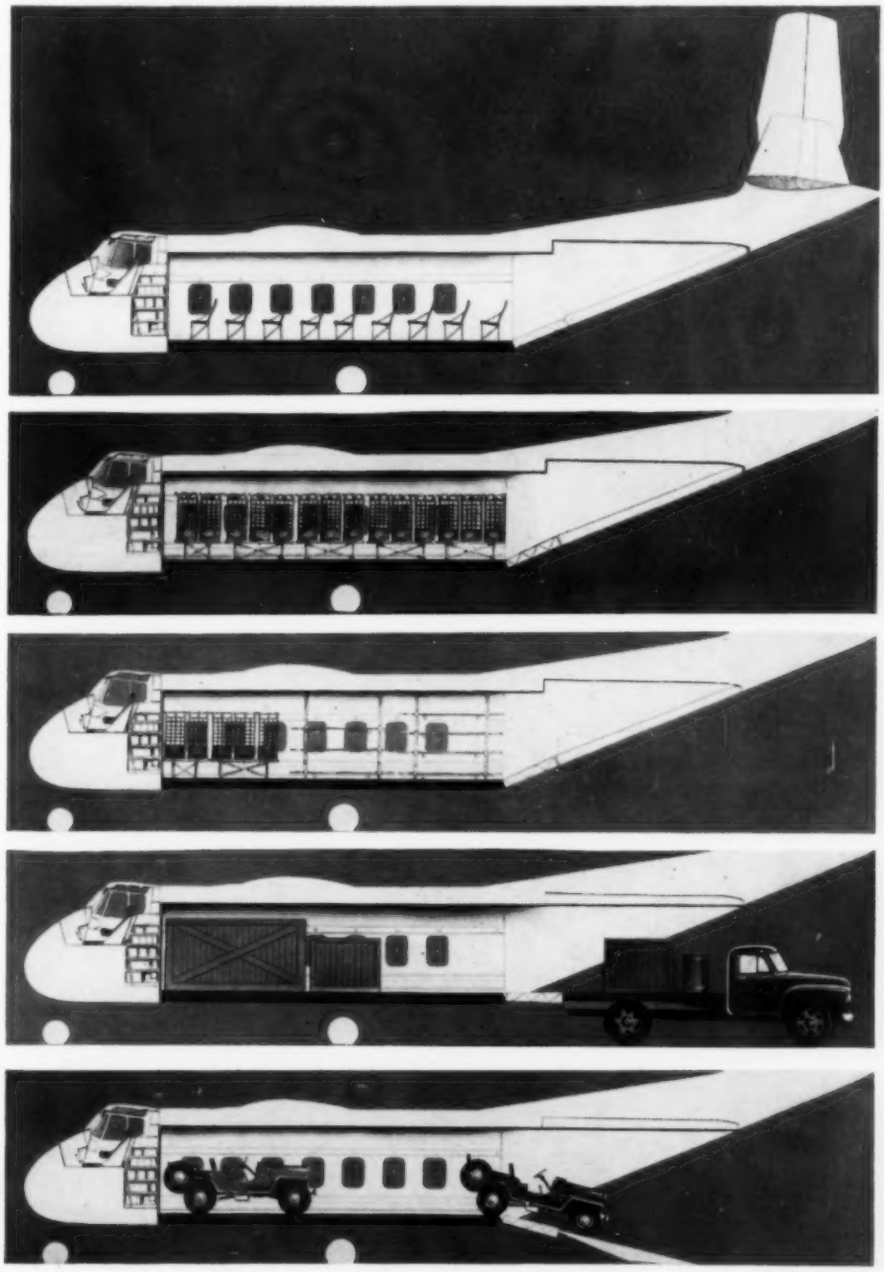
Factory Design Data

Powered by 2 P & W R-2000-D5 engines, each rated at 1,450 hp. @ 2,700 rpm. at sea level for take-off and at 1,200 hp. @ 2,500 rpm. for maximum continuous power.

Gross Wt., lbs.	**24,000**
Empty Wt., lbs.	**14,500**
Useful Ld., lbs.	**9,500**
Cr. Spd., 51% hp., 750 hp. per engine, 7,500 ft., mph.	**185**
Landing Spd., with flaps, mph.	**59**
Take-off Distance, ft.	**330**
Take-off Distance to Clear 50 ft., ft.	**650**
Landing Distance, ft.	**230**
Landing Distance from 50 ft., ft.	**550**
Rate of Climb, fpm.	**1,580**
SE Rate of Climb, fpm.	**420**
Svc. Clng., ft.	**26,000**
SE Svc. Clng., ft.	**13,000**
Range with full tanks, mi.	**1,200**
Payload Range (freighter) —	
6,000 lbs., mi.	**600**
6,700 lbs., mi.	**400**
7,320 lbs., mi.	**200**
Span, ft.	**95**
Length, ft.-ins.	**63-8**
Height, ft.-ins.	**27-9**
Wing Area, sq. ft.	**920**
Aspect Ratio	**10**
Clear Ht., under tail, ft.	**10**
Floor Dimensions,	**23 ft. by 73.5 ins.**
Floor Ht., from ground, ins.	**42**
Cabin Width, elbow ht., ins.	**83**
Cabin Ht., ins.	**87**
Cabin Volume, cu. ft.	**1,052**

NOTES: All performance is for gross weight at sea level unless noted. Take-off and landing figures are for 10-mile wind. Payload-range figures include fuel allowances for climb from sea level to altitude, descent to sea level, final circuit and landing, plus 45-min. reserve at cruise power. Weight allowances for freighter are as follows: Empty, 14,500 lbs.; radio, 200 lbs.; pilot and crew member, 340 lbs. Additional weight allowances include de-icing equipment, 315 lbs. and furnishings for passenger version, up to 1,500 lbs. Factory design data as of March 4, 1957.

These de Havilland sketches show versatility of the Caribou cabin, which has a floor 23 ft. long and 73.5 ins. wide with inside height of 87 ins. Level floor is 42 ins. off ground. Normal seating is for 24 passengers.



Robertson research VTOL twin grosses only 4,000 lbs. but power-pods provide about 1,000 hp. Tip tanks fence in large two-section flaps which redirect prop slipstream downward.
—(Robertson Aircraft Sketch.)

Light Twin For VTOL

AFTER three years of research and development, Jim Robertson of Robertson Aircraft Corp., at Ft. Worth, Texas, is constructing a light twin-engine VTOL (vertical take-off and landing) airplane from components of proven conventional aircraft and expects to make his first flight this summer. The project, identified as Model M-287 and named the "Rainbow" because it is designed to operate throughout the entire sub-sonic velocity spectrum, is a pure research vehicle. It does not represent any design aspiration for a production version but instead is an experimental combination of components with which to seek the answers to numerous VTOL problems under actual flight conditions.

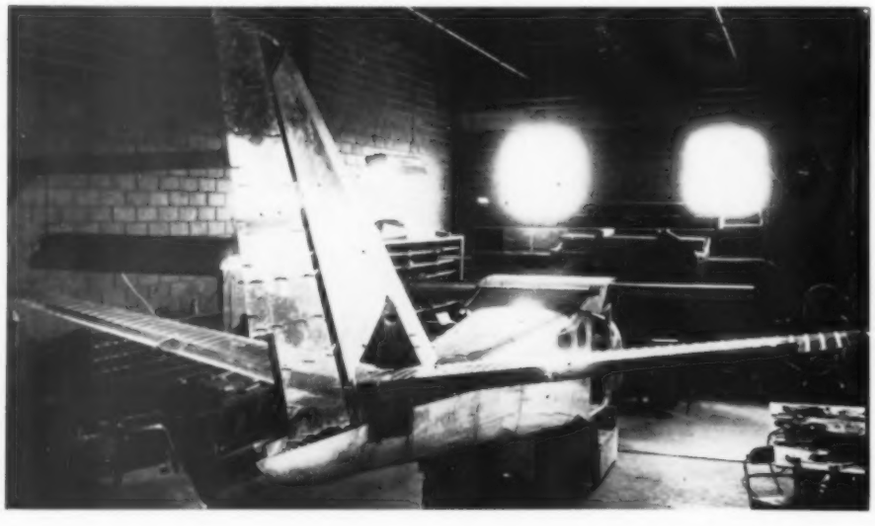
As the accompanying sketch and photographs show, the machine resembles a very high performance light twin, there being nothing radical in its design layout. The stub wing, its sharply-swept tips and its two-section, slotted flap system have not appeared on anything but laboratory scale models. The sharply-swept tips are a Robertson concept to minimize the longitudinal pitch-change problem in going from hovering to forward flight.

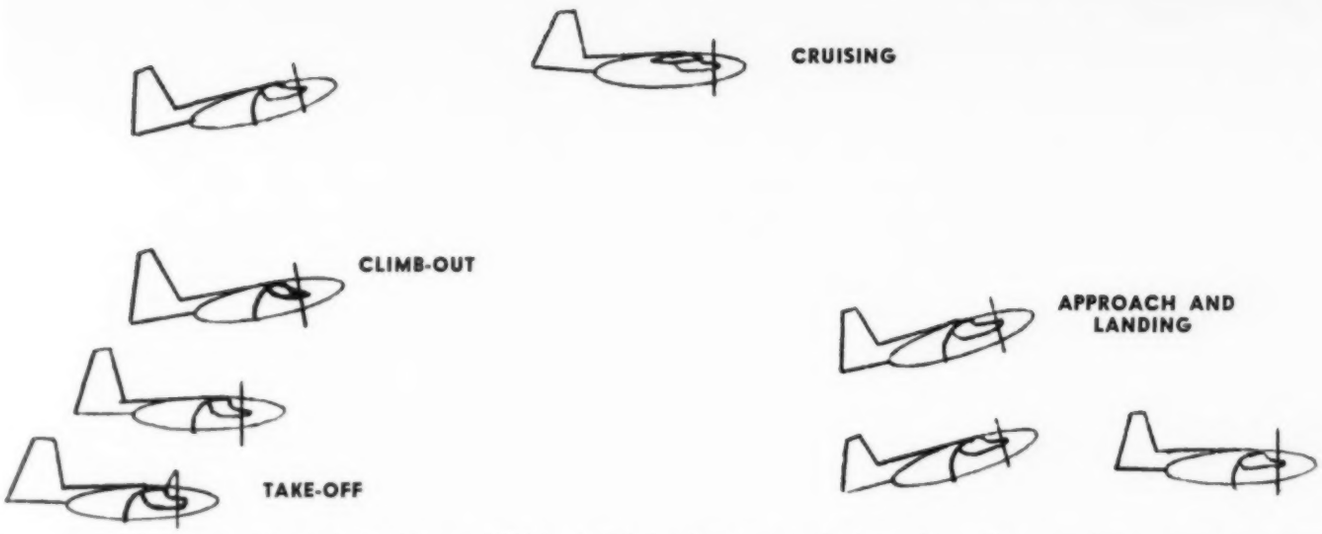
What is new and radical in the M-287 is Robertson's pioneering application of stability and control methods. Stability and control problems are the major weakness in VTOL designs, many of which are currently being studied in developmental projects here and in Europe. It is generally conceded that modern engines, especially turboprops, provide adequate power or thrust to offset aircraft weight and thus make vertical take-off and landing possible. But aerodynamic control surfaces are ineffective or completely useless at slow speeds and in fixed-wing hovering or vertical flight.

One of Robertson's solutions is an "inertial control system." It provides for a high-rpm. flywheel device whose rotation and mass (it will weigh 60 lbs. or more) give it the characteristics of a gyrostat. In the VTOL, its force or impressed precession will supply sufficient inertial control moments directly to the airframe to correct for longitudinal pitch-changes under slow flight conditions in which the conventional control surfaces are ineffective due to the absence of aerodynamic forces. Robertson will not divulge complete details of the inertial control system.

His research vehicle will gross about 4,000 lbs. as a VTOL, with a 2,450-lb. empty weight, giving it a useful load of about 1,450 lbs. Span is 27 ft. and wing area is only 125

Construction of research VTOL is nearing completion in Robertson Aircraft shop near Ft. Worth and first flight is scheduled this summer. Components from Cessna 180, North American T-6, Fairchild PT-19 and other aircraft were used.
—(FLIGHT MAGAZINE Photos.)





Sketches show flight path of the Robertson VTOL. Arc behind engine pod shows large flap travel necessary to vector slipstream vertically downward. Although no ground run is necessary, take-off utilizes slight forward moving pattern. Flap retraction for cruising leaves stub wing clean for very high speeds, providing VTOL's major advantage over helicopters.

sq. ft. While Robertson withholds power-plant details, he says his power loading will be down around 4 lbs. per hp. and his wing loading will be up around 32 lbs. per sq. ft.

The Rainbow will be a very powerful aircraft for its weight, indicated power being about 1,000 hp. It has to be for VTOL characteristics, for available thrust must exceed gross weight to achieve vertical rising. For takeoff its static thrust will probably exceed 4,400 lbs. The engines are pod-mounted beneath the wing and drive conventional propellers.

Large, slotted flaps, in two sections, are extended from the wing trailing edge back and down almost to the ground for take-off or landing vertically and are retracted for forward flight. They have an area equal to about 60% of the wing area and they are pivotally operated, being attached on arms instead of rails or tracks. Wing-tip and underslung fuel tanks fence in the flaps.

These flaps redirect the propeller slipstream from horizontal to vertical direction, vectoring the thrust downward.

The transition from vertical take-off to forward flight is made by holding the nose level while retracting the flaps. Climb-out is almost automatic as lift from increasing forward speed arcs the aircraft upward in a fuselage-level climb pattern. Full power will probably be held until airplane flight is achieved at about 90 mph., which is above the aircraft's minimum single-engine control speed of about 85 mph.

As the large flaps are retracted, reducing the wing and flap area by some 60%, drag and lift are greatly reduced and very high forward speeds are available because of the abundance of power. This is one of the major advantages of a slipstream—redirector type of VTOL aircraft. The Robertson M-287 is described as having a design cruising speed slightly under 300 mph. The numbers indicate it will have a never exceed speed of close to 480 mph., at which the flow on the wing approaches the trans-sonic.

For a landing, the pilot would reduce power and gradually extend the flaps. With the first section extended only, slow flight at the transitional speed of about 90 mph. would be achieved as with a conventional aircraft using full flaps. For the vertical landing, power would be carefully reduced as the second section of the flaps goes down — too much power would provide first hovering and then vertical climbing. As all forward speed is dissipated, the generation of lift again devolves upon the propulsion system. Thus an increase in power is required to maintain altitude. A slight decrease in this power eases the aircraft downward into its vertical landing. As can be seen, power becomes a primary control in a VTOL.

For power emergency conditions, the research aircraft will use two small standby-thrust rocket bottles, one in each nacelle mounted on a swivel and having linkage with the flaps. The rocket-firing button automatically retracts the flaps. Engine failure will be critical for the VTOL and these rockets will be rated at 2,300 lbs. of thrust each for a burning duration of 22 seconds each. "The procedure will be to hit the rocket firing button first in case of failure of either engine, then close both engine throttles," Robertson said. "The idea is to gain sufficient speed for airplane control, after which the good engine is brought back to power and a conventional airplane landing on one en-

(Continued on page 68)

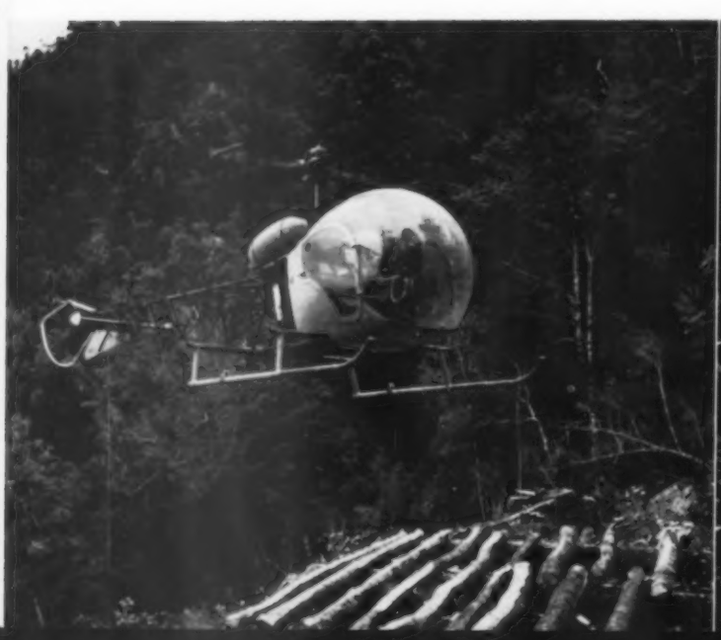
Robertson Aircraft's first design was the STOL research airplane called the Skylark, which first flew in 1954. Note full-span, large-area flaps and leading edge, full-span slots. Firm limits itself to engineering research only, has no sales or production plans.

Copter For Uranium

THE beautiful photos on these pages show the New Zealand operations of a 3-place Bell Model 47G helicopter which accomplished in 4 hours work that which would have required three months by men and packhorses.

The task was establishment of a work camp high above a Buller River gorge by Nelson Lime & Marble, Ltd., whose prospectors had found uranium on a 5,000-acre claim in rough bush country. Helicopter Services, Ltd., furnished the helicopter after 12 men labored two days hacking out an 80-ft. square clearing on a lip overhanging the gorge.

Using a platform made of trees felled for the clearing, the Bell hauled 7,000 lbs. of equipment and supplies



to the lofty perch in 14 hops, averaging about 8 mins. per hop from the river bank where the supplies had been trucked in — tents, lumber, heaters, wire, bedding, food, tools, a power-driven drill and fuel. "Benny's Landing," they called it, after C. H. Benny, the under-secretary for mines. R. J. Scott of Hamilton, N. Z., was pilot. Seabrook Fowlds, Ltd., Auckland, furnished the photos and information to Bell Helicopters of Ft. Worth.

Loading of Bell 47G on river bed flight alongside steep wilderness and "Benny's Landing" high above New Zealand's Buller River gorge are shown in the photos.

U.S. AIR FORCE

USAF F-104 Starfighter, the "Missile With a Man in It."

IF, AS YOU READ THIS, YOU SHOULD HEAR A LOCKHEED F—104 STARFIGHTER FLYING OVERHEAD, DON'T BOTHER TO LOOK FOR IT. THIS WORLD'S FASTEST JET WILL BE OUT OF SIGHT BEFORE YOU CAN FINISH READING THESE FEW WORDS.

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Beech L-23 Twin-Bonanza taking off from Davison Army Airfield near Washington, D. C., may be headed for Atlanta or Alaska. From the flight office pictured below, the Army's fleet of Washington-based lightplanes and helicopters logged 1.5 million accident-free passenger miles in the last 18 months. Less than half the Davison fleet of 50-odd aircraft are fixed-wing airplanes.

Hemisphere Mobility For Army Aviation

By JIM GREENWOOD
Photos by Jim Yarnell

IF anyone has any doubts about the diversified capabilities of aviation in support of United States Army ground forces, he should pay a visit to a small military airfield tucked away in the Virginia pine some 20 miles southwest of Washington, D. C.

Named Davison U. S. Army Airfield, in memory of the late Brig. Gen. Donald A. Davison who headed the original Army Engineer Aviation Unit, the activities of this busy command are demonstrating daily the workability and utility of aircraft as aerial vehicles capable of providing the Army with greater tactical and logistical mobility.

Davison occupies 160 acres of cleared land near Accotink, Va., situated on part of the Fort Belvoir military reservation — home of the Army Engineer Center. Here a large fleet of airplanes and helicopters, ranging from three-place Hiller H-23 reconnaissance craft to six-place Beechcraft L-23 Twin-Bonanzas, performs a wide

American Airlines test pilots Ken Herschel (*left*) and Dick Green (*right*) tell Fisher about the program of an impending flight te

One of a series on the care taken by leading airlines to keep their planes fit for flight—and why this care has led them to select CHAMPION SPARK PLUGS. First—American Airlines and a look at . . .

C.A.V.* at Tulsa

By **HERB FISHER**

**Continuous Airworthiness Visit*

HERB FISHER,
international aviation authority,
veteran test pilot, and author

RECENTLY I was a much impressed visitor to the vast American Airlines Overhaul and Supply Depot at Tulsa, Oklahoma, where the world's largest airline fleet operating from a single maintenance base is kept in top flight order. Each of American's 200 planes comes to Tulsa at least six times every year—1,200 aircraft visits in 12 months—more than 1,500 engines completely rebuilt. In the shop, and outside on the flight line, nearly 4,000 skilled employees do the huge maintenance job needed to "keep 'em flying."

Tulsa has the dual functions of preventive maintenance and progressive overhaul. Both have the single objective of finding and correcting trouble before it starts, and before an airplane is "out of hours" and ineligible to carry passengers. American predicts, with amazing accuracy, the working life of almost every piece of equipment. This makes the job of the maintenance department clear, if not easy. The department sets up its schedule so that it anticipates mechanical trouble and takes preventive action before it occurs.

A good example of American's preventive maintenance is the autopilots flown on American's aircraft. Autopilot system components have a CAA authorized overhaul period of 5,000 hours. American pulls them at 2,500 hours —an admirable illustration of the lengths to which the airline will go to insure safety and reliability.

C.A.V. — Schedule for Airworthiness

Progressive overhaul is American's other maintenance must. Operating on a regular schedule, every aircraft in American's fleet visits Tulsa for its C.A.V.—Continuous Airworthiness Visit. About ten days are required per visit, during which time AA's inspectors and mechanics will perform an average of 5,400 different jobs on each aircraft, taking thousands of man-hours. Nothing is overlooked.

When a plane arrives in Tulsa for its C.A.V., inspectors are assigned to go over the entire airplane, checking its structure, functional systems, appearance, etc., using special test equipment. In ten days the plane leaves Tulsa "newer than new," but just a little more than 2,000 hours away from its next visit.

Using this technique, American has never had to take an airplane completely apart. These trips to Tulsa do the "out of hours" overhaul job progressively—and do it better.

Champions Proven on Engine Line

I was especially interested in the engine line, where every single piece of the big Pratt & Whitney and Curtiss-Wright turbo-compound power plants gets a meticulous inspection. I saw the typical overhaul for engines, running from

American Airlines technicians put rebuilt engine through its paces in test cell before running flight tests on it.

These four hangars—center of American's maintenance operation—contain 15 acres of floor space, handle 1,200 aircraft overhaul visits a year.

Transferring Champion Spark Plugs from original carton into American's engine-set box for shipment to line station. Champion's consistent high quality makes this possible without further inspection.

C.A.V. at Tulsa . . .

a special report for Champion Spark Plug Company

Top American Airlines executives at Tulsa tell Fisher of Champion's highly satisfactory performance. *Left to right:* E. O. Schroeder, Assistant Vice President, Quality Control Division; Fisher; J. B. Montgomery, Vice President, whose duties include supervision of the Tulsa base; W. C. Lawrence, Assistant Vice President, Engineering Division; and D. F. O'Donoghue, Assistant Vice President, Overhaul Division.

dismount and disassembly through cleaning, parts inspection, rework where needed, reassembly and testing.

It was during parts inspection, which includes tests on spark plugs and other engine components, that American began telling me about the splendid record of reliability, service, and economy of Champion Spark Plugs.

W. C. Lawrence, Assistant Vice President—Engineering, said that the whole area of ignition—spark plugs, magnetos and leads—has been the No. 1 cause of mechanical delays during the last 21 years. It is for this reason, he told me, that American particularly likes Champion's dependability and economy.

"American's philosophy is to search constantly for the most reliable ignition components available," said Lawrence. "We want simplicity, reliability, and ease of maintenance, and Champion has proven over the years to give it."

T. J. Harris, Director of Power Plant Engineering, stated that he admires Champion's research and development program, and their desire to define and resolve ignition and spark plug problems. He feels that Champion has made a notable contribution to American's operation.

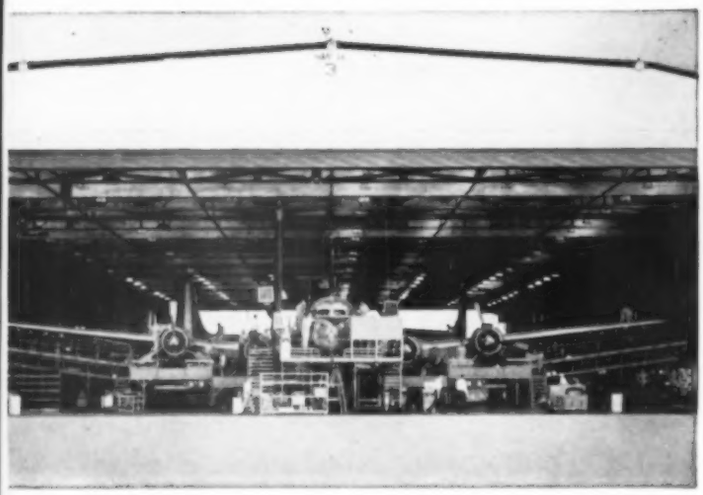
Demand Quality with Economy

E. O. Schroeder, Assistant Vice President of Quality Control Division, told me about AA's experience with Champion economy. "For years the airlines have had to concentrate on obtaining the best possible parts and accessories that would cause the least trouble. But now we are at a stage where aviation has turned into big

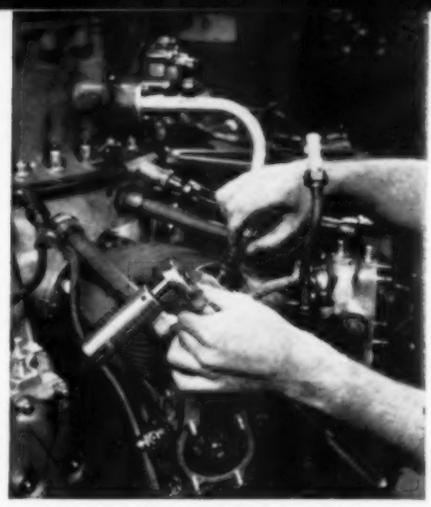
Champion Aviation Representative Russ Biegel monitors line service spark plug installation as part of service coverage. Technical information gained is available to all Champion users.

The engine line produces 1500 "new" engines a year. After four hours in test cells, running at all speeds, engines are flight tested by engineering test pilots for another four hours.

D. E. Tait (*left*), Directo of Supply, had favorabl comments on Champion' service, economy and avail ability. T. B. Robertso (*center*), Manager of Pur chasing; (*right*), T. J. Harris Director of Power Plan Engineering.



During a C.A.V., the interior is completely disassembled, freshened, and rebuilt where needed. All structure is completely inspected and components are replaced as required. Even X-ray is used for checking critical areas.



Removing spark plugs from engine for careful testing. Rigorous inspection over the years has kept American convinced of Champion's dependability.

business. As a result, without any slacking of quality, people in the aviation field must be concerned with price as well—and Champion has been a leader in reducing spark plug prices.

"Spark plugs are a major expenditure with us, and we consider ourselves fortunate to be able to get a quality product for the lowest price consistent with reliability and performance."

10,000 Hours on Champions

Another American man that I later talked to at New York International Airport was Captain S. P. Bittner, who started flying September 14, 1924, and has accumulated 30,000 flying hours. He has been flying for American since 1929. Since Champions have been used for 10 years, Capt. Bittner has flown approximately 10,000 hours with Champion Spark Plugs, or roughly 40,000 engine hours. Capt. Bittner stated that after flying for 10 years with Champions he has never encountered true plug trouble.

The final word on Champions came from J. B. Montgomery, American Vice President—Maintenance and Engineering. "These plugs give us the high, consistent quality we need to assure long life and trouble-free operation," Montgomery declared. "We also like Champion's realistic price structure and the fine factory and field service they give us.

"Champion has built excellent spark plugs over the years for American Airlines. If they were not a quality product, they would not be on our engines."

The Champion people feel that American's experience speaks for itself in indicating to *all* pilots the superior performance and reliability of Champions.

—HERBERT O. FISHER

If you have the responsibility of selecting aircraft spark plugs, consider the fact that American Airlines . . . with millions of engine-hours experience as a guide . . . chooses CHAMPION SPARK PLUGS

Capt. S. P. Bittner, American pilot since 1929, tells Fisher he has flown 40,000 engine hours on Champions without encountering true plug trouble. Capt. Bittner flies the non-stop flight between New York and Los Angeles.

Major General Hamilton Howze (left) director of Army aviation, pilots himself on trips from Davison. L-23 above discharges passenger.

variety of missions around the clock, seven days a week.

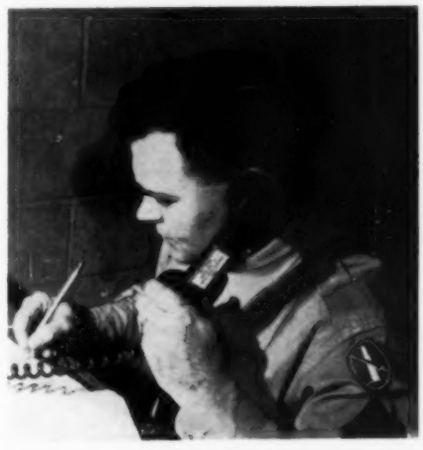
Key people of the Department of the Army are whisked off to important appointments, emergency aid is rushed to disaster areas, and critical freight is speeded to Army bases near and far. In fact, Davison's radius of operation extends to almost any point in the Western hemisphere.

While most flights are confined to the States, trips outside the continental U. S. are not uncommon. Recently Col. Hallett D. Edson, Army Aviation deputy chief of staff, logged 55 hours and some 7,000 miles in an L-23B during a two-week inspection tour of Army air units supporting the Inter-American Geodetic Survey, a cooperative mapping program in which this nation and Latin American governments are participating.

With the colonel were Davison pilot Capt. Robert D. Mathias and Sp3 William O. Goetz, mechanic. Aside from the flight's purpose, the fact the L-23 was subjected to long hours of continuous operations under a wide range of conditions in Central and South America further pointed up the exceptional performance and dependability of the Army's light twin-engine aircraft.

"Not once did we experience the slightest mechanical difficulty," said Colonel Edson upon his return. The colonel was also impressed by the L-23's fuel consumption. "We burned between 21 and 23 gallons, somewhat less than the anticipated average."

Colonel Edson's itinerary included Cuba, Guatemala, Costa Rica, Mexico, Canal Zone, Honduras, Nicaragua and



Placard identifies this phone as White House line. Using it is Master Sergeant Norman Koenig, operations sergeant.

Local transportation is furnished by Vertol H-21 (right), Hiller H-23 (below) and other copters. Panel below shows H-23 on Pentagon heliport, also pictured from the air, and a copter view of the Pentagon-Davison shuttle route.

Colombia, where the variety of terrain ranges from steaming jungles to snow-capped mountains. Much of the flying was over open water. The hop from Jamaica to Panama, for example, required nearly five hours of flying over the Caribbean. Once en route the colonel and his crew encountered rather primitive service facilities, to say the least. At a refueling stop in Mexico they found no means of pumping gas into the L-23. So the natives simply poured fuel from huge drums into small buckets made of goat skin (complete with hair attached), then into the Twin-Bonanza. Naturally, Specialist Goetz and his superiors strained the fuel as it dribbled into the tanks. Goat hair and gasoline won't mix.

At the other end of the hemisphere last winter, Davison Operation Officer Capt. William G. Rutherford, piloting another L-23B, flew a Fort Belvoir engineer deep into Canadian bush country to study road and air strip repair in remote sections where climatic changes present a never-ending maintenance problem.

The flight covered 10,000 miles, touching such spots as Yellowknife, White Horse and Dawson. From Hudson Bay to the Yukon and west to Fairbanks, Alaska, the L-23 was flown over some of the most rugged regions in the Northwest Territories. Some of the gravel and sod strips it operated in and out of would put the best bush pilots to test. As in the case of Colonel Edson's flight, Captain Rutherford's L-23 functioned perfectly even though temperatures at altitude were generally down around minus 30 degrees centigrade — cold enough to freeze the flanks off a caribou.

Not long ago a Davison L-23 hauled a new type of electronic topography survey equipment to the Canal Zone in four round trips. Once an L-23 returning from an aerial mapping expedition registered a ground speed of better than 340 mph. between Jamaica and Miami, with the help of an approaching hurricane.

The airfield has a single hard-surface runway 3,000 feet in length with an overrun of about 1,200 feet. which eventually will be paved. Moreover, the field will soon be fully instrumented for all-weather operation, including GCA.

Physical facilities consist of two hangars and 10 buildings, of which six are permanent. A new heliport, two additional hangars and a new operations building are under construction and other projected improvements are in the mill. Types of aircraft assigned include the Beechcraft L-23, Aero Commander L-26, Cessna L-19, de Havilland L-20, Sikorsky H-19, Hiller H-23 and the Vertol H-21 cargo helicopter.

The airfield's commanding officer is personable Lt. Col. Charles M. Neufeld, a former Navy flier. Like many career officers, Colonel Neufeld switched from another branch of service because he felt Army aviation offered new opportunities, a new challenge. Like the others, he, too, is convinced Army Aviation has only one way to go — up.

Compared to most Army Aviation units, Davison is unique. Its close proximity to the nation's capital imposes unusually heavy demands on aircraft. Emergency missions (including evacuation of defense chiefs in time of enemy attack) have top priority, but air lifting general officers and equivalent rank civilians sponsored by the Department of the Army keep Davison pilots and planes hopping.

One telephone in the operations office bears the label, "This Phone Restricted to White House Business Only." Yep, it's a direct line. Frequently White House staff members are Davison passengers. In fact, Davison personnel could probably qualify among the greatest "name droppers" in the nation.

When a flight is requested for a top military or government official, the trip appears on the operations scheduling board as a PAT — short for priority air transportation. Names already on Davison manifest records include notables such as Vice President Richard N. Nixon, Secretary of State John Foster Dulles, Defense Secretary Charles Wilson and Secretary of the Army W. M. Brucker.

One of the principal users is Maj. Gen. Hamilton H. Howze, Director of Army Aviation and a rated aviator who does most of his own flying. General Howze, incidentally, is now an instrument-qualified twin-engine pilot.

In the past 18 months Davison aircraft have flown a total of more than 1.5 million accident-free passenger miles, one of the best safety records in Army Aviation. Over 2,700 passengers were carried in 1956 alone and of this number 1,000 were VIP's. Davison's monthly average of 1,600 flying hours may seem unimpressive, but consider that of its 50-odd assigned aircraft, less than half are fixed-wing types.

However, the airplane fleet will soon be augmented by the addition of two new 340-hp. supercharged L-23D command transports, military version of the 1957 commercial Beechcraft E50 Twin-Bonanza business plane. Speaking of L-23's, it is interesting to note that Davison is also operating one of the four original "hand-made" YL-23 units delivered to the Army five years ago.

"Three or four aircraft today are doing the same job we used to expect from six or seven," said Captain James Kishi, field maintenance officer for Headquarters Company. Captain Kishi,

REVOLUTIONARY HELICOPTER POWER PLANT PROGRESS is being accomplished on this rotor test stand at Schenectady, New York, by two General Electric T58 shafted turbines. The T58 weighs only 325 lbs. with reduction gearing, GE says, but produces over 1,000 hp. for a power-to-weight ratio nearly three times greater than piston engines. It is scheduled to power Sikorsky HSS and Vertol H-21 helicopters.

who stands six-feet-three and weighs 240 pounds, is probably the Army's biggest American-Japanese. He hails from Houston, Texas. A rated airplane and helicopter pilot, Captain Kishi's outstanding qualities of leadership and vast technical knowledge are known throughout Army Aviation. Because of this, Davison has more than its share of transient Army aircraft seeking maintenance work under the genial captain's able supervision.

Roughly 20 per cent of Headquarters Company maintenance personnel are civilians headed by Jimmy Millan, himself a veteran flier and widely known figure in aviation circles along the eastern seaboard. Captain Kishi and Millan have developed a spirit of cooperation between military and civilian components that would do credit to any organization. This excellent working relationship, plus the experience level of civilian and uniformed aircraft technicians, is directly responsible for Davison's high quality of maintenance.

Maintenance of the big rotary-wing H-21's is equally efficient. Not long ago the 153rd earned a special commendation from General Howze for "consistently maintaining the highest availability of cargo helicopters of any unit in the United States Army."

While most flight operations are classed "routine," at times Davison captures the public eye by accomplishing dramatic and often heroic mercy missions. Eighteen months ago, Under Secretary of the Army Charles S. Finucane presented a special unit citation to Davison's helicopter company, then the 509th, for rescue and support operations during the devastating floods throughout the northeastern states.

Operating their H-21s, men of the 509th flew 189 hours during the emergency, evacuating 220 persons and carrying 45,570 pounds of food, medical supplies and other cargo. Another time the prompt action of a Davison crew flying an H-21 over a sparsely-settled section of Vermont saved the life of a heart attack victim by transporting the stricken man to a New Hampshire hospital.

But whether engaged in rescue work, hauling cargo, transporting VIP's, assisting in topographic surveys, or shuttling back and forth between Fort Belvoir and the Pentagon heliport, Davison is proving the value of flexible mobility of personnel and equipment in the modern military concept. Its daily activities are further evidence that support aviation is an integral part of the United States Army.

JUST AMONG OURSELVES

(Continued from page 19)

presidential Lockheed Constellation) was to provide relief for thousands of motorists in and around Washington who are constantly held up by an old American secret service custom of blocking traffic when a Presidential party passes by. With the Bell helicopter now available to the President, ground traffic problems are eliminated, the President's short-haul travel is expedited and the ground-bound motorists go blithely on their way.

Only a nitwit would complain about providing the President of the United States any kind of transport vehicle available.

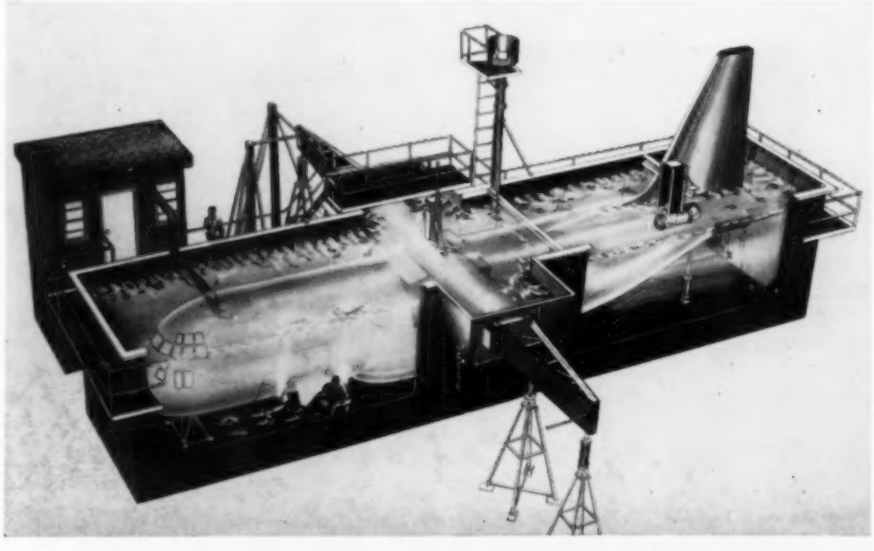
Ed Travis

THE untimely death last month of veteran CAA airport man, S. E. (Ed) Travis, Jr., from a heart attack is as great a loss to aviation as it is to his own family. Ed Travis gave a quarter century of dedicated service to aviation with the WPA and Civil Aeronautics Administration office of airports, beginning back in the depression when the WPA initiated what later became the Federal Airport Program.

Ed Travis was a graduate engineer, an excellent pilot and above all a fighter for what he believed in. He preferred to stay "out in the field," actually building airports and guiding communities along the right path to aviation development rather than accept the many opportunities he had to run the whole show from Washington.

More than any other one man involved in the airport development of this country during this generation, Ed Travis spent his professional government career fighting for the proposition that ground and airspace belonged to all. Many was the time that military men, little versed in the importance of general civil aviation or scheduled air transportation, tried to run roughshod over these segments of aviation (just as the Navy is attempting at New Iberia, Louisiana, at this writing); but with Ed Travis in there pitching on the basis of fairness and right, they were usually stopped in their tracks.

Many an airport, particularly over the southern and southwestern landscape, are permanent monuments to the memory of Ed Travis. But what's more important is the loyal, dedicated staff he leaves behind him within the present CAA structure. We're confident they will carry on in the best Ed Travis tradition.



Hydrostatic Fatigue Tests for Lockheed Hercules

IN a 100 by 20 by 20-ft. steel tank holding 270,000 gals. of water at Marietta, Georgia, the Lockheed C-130 Hercules prop-jet fuselage shown above is undergoing hydrostatic fatigue tests to perfect its structural integrity against possible rupture or failure from fatigue while pressurized in flight at 35,000-ft. altitudes. At that height, the cavernous cabin of 9,300 cu. ft. is pressurized to maintain an 8,000-ft. altitude.

Each time a highly-pressurized airplane climbs to high altitude, the fuselage expands slightly under internal pressurization, and when it descends and lands, it contracts. Fatigue failure is charted in the tank by applying a series of alternating internal cabin loads with water pressure and jacks. Skin divers and instruments find the cracks and engineers revise the structure accordingly. It takes only 72 seconds to simulate a 3-hour "flight" and Lockheed is taking the Hercules through 20,000 underwater cycles to accumulate the equivalent of 60,000 hours of flight — 20 years of transport flying.

With Edo 4580 floats and small stabilizer fins added, the Howard Jobmaster will climb up on the step and plane on the step hands-off, taking off from glassy water in 20-25 secs. Complete Jobmaster, airplane and all, sells for less than $25,000, including newly-majored 450-hp. Wasp Junior and new Edo floats.

Howard Jobmaster Float Conversion

THERE are still some people who use the old but fast Pratt & Whitney-powered Howard DGA and they call it exactly what Benny Howard named it originally — damn-good-airplane. CAA approval of a Howard conversion on floats has now been obtained by an oldtime bush pilot in Seattle and he has named his conversion the Howard Jobmaster and expects people will be calling it the DGFP, the last two letters for floatplane.

"Many pilots think the Howard had poor landing habits on wheels and are a bit leary of it, but I can assure them that the Jobmaster conversion to floats has harnessed this wonderful beast and it now lands on floats like a hen squattin' on her baby chicks," says Clayton Scott, who devoted several years of spare-time work and family savings to the task of obtaining CAA approval of the conversion.

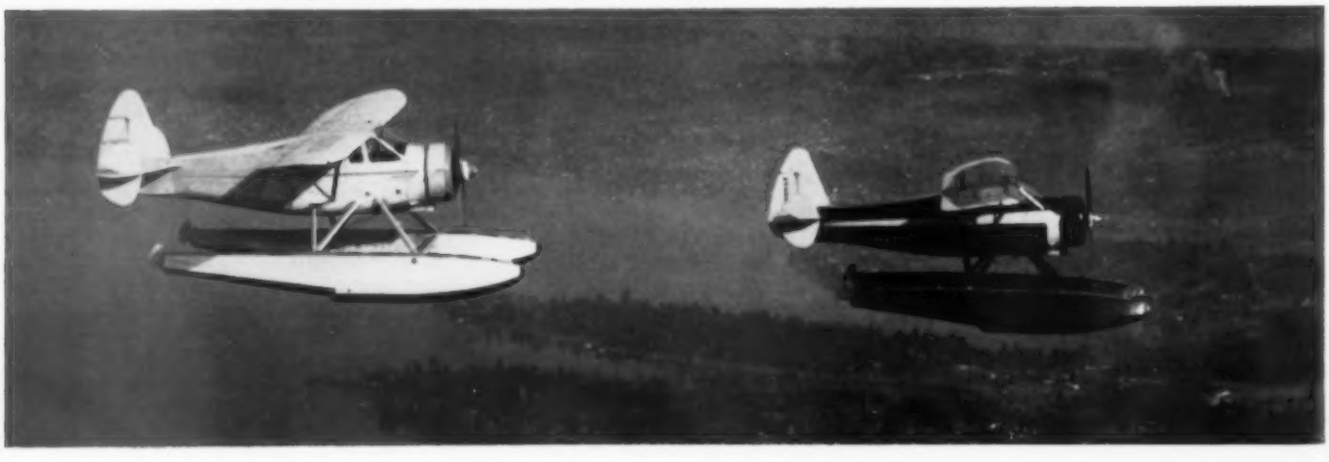
"It has no bad habits at all and is one of the sweetest water-handling ships in the business. It will climb up on the step without the pilot having to touch the control column and plane on the step, hands off."

With its 450-hp. engine, the float version will take off from glassy water at 4,800-lb. gross weight in only 20 to 25 secs., climb 800-1,000 ft. per min., and cruise at 150 mph. at 7,000 ft. on 70% power, says Scott, who is Boeing Airplane Company's senior production test pilot in the daytime and head of his own Jobmaster Company at night, on weekends and when it rains too hard to test-hop B-52's, KC-135 tankers and other Boeing products. His Jobmaster shop is in a tidy hangar near the water end of Seattle's Renton airport, and in its "front yard" is the granite marker identifying the spot from which Wiley Post and Will Rogers departed the United States on their ill-fated jaunt to Alaska.

Scotty brags on his Jobmaster con-

(Continued on page 65)

Clayton Scott has converted three Howards to floats and here are two of them near Seattle. At 4,800-lb. gross, they cruise 150 mph. at 7,000 ft. using 70 per cent of power and have over 5 hrs. of range.



"No doubt about it, Jack... the safest engine is a clean engine... and there's no cleaner engine than a Gulf-lubricated engine!"

Use new Gulfpride Series D, the detergent oil, or Gulf's Aircraft Engine Oil, the straight mineral oil. Either way, you'll be keeping your engine clean, and playing it safe.

Not only do Gulf's oils lubricate engines thoroughly and efficiently. They also keep engines clean.

That means increased periods between engine overhauls, because of less wear and tear on engine parts.

Gulf's Aircraft Engine Oil is the finest straight mineral oil you can choose—keeps engines as clean as any straight mineral oil can. But for the greatest possible cleanliness, buy Gulfpride Series D, the detergent oil.

Gulfpride Aviation Oil—Series D. Detergent Oil—for greatest possible cleanliness in radial, inline and horizontally opposed engines.

Gulf Aircraft Engine Oil—Straight Mineral Oil that minimizes sludge and oil inlet screen deposits, keeping your engine clean and safe.

GULF
AVIATION PRODUCTS

...the world's finest aviation products

CONVAIR 440 CUSTOM INTERIOR BY AIRESEARCH AVIATION SERVICE of Los Angeles is shown above and below in the new 20-passenger Convair of John Mecom, Houston oil man. Cabin has TV, radio, recorder and two-way FM radio, with decor of blue, brown and walnut. Seating includes two 3-place berthable divans, a 5-place curved divan and sets of double berthable chairs with swivel chairs. Cabinets and a portier bulkhead are of walnut. The portier drapes and window curtains are of matched salamander silk. Large conference table has hinged top. Behind the aft cabin bulkhead are the bathroom and vanity featuring beige marble Formica and in front of the forward cabin are lavatory with sink facilities, large walnut buffet and hot food facilities. Entire cabin has handrails along both sides. These are covered with pecan leather with walnut top. Headliner and carpet are blue and upholstering is in combinations of brown and blue, leather trimmed. Large ottoman provides internal storage. —(AiResearch Photos.)

NEW LIGHTWEIGHT BENDIX X-BAND RADAR transmitter-receiver (left, above) weighs only 26 lbs. and is shown with 21-lb. synchronizer-power supply (right). New RDR-1D unit is in a 1/2-ATR package but retains all basic features of the larger RDR-1, including 150-mi. range. Two new 15- and 18-in. sector-scanning antennas are under development for it.

NATIONWIDE ROUNDUP:

New Business In the Hangar

REMMERT-WERNER at St. Louis services aircraft for all types of utilization but one of the most interesting workplanes on their Lambert Field ramp last month was a Douglas B-18 operated by Christler & Avery of Greybull, Wyoming, in for a double engine change. This B-18 is used for the application of bug-killing chemicals on forests. It takes off from a field at 8,000-ft. elevation and applies the chemical from an altitude of 10,000 ft., which is 1,500 to 2,000 ft. above the tree tops. The B-18 has also been used to apply chemicals to kill fruit flies on the east coast of Florida. . . . Other interesting R-W jobs in April included: Minneapolis-Honeywell DC-3 in for Bendix X-band radar and Sperry H5 electric horizon. A set of R-W wheel-well doors and short stacks went on the DC-3 of Allen Scaife of Pittsburgh, piloted by Jim Leonard. Maj. Carlos Garduno picked up another R-W DC-3 for the Banco de Mexico and is bringing in another one for complete conversion next month. Steuart Petroleum of Washington, D. C., Dewey Peterson, pilot, is getting a Custom 18. Numerous ARC ADF-21 installations include General Insurors' Aero Commander of St. Louis and the R. B. Potashnick Construction Lodestar

Shell Announces

AeroShell Grease 14

. . . a new grease designed for Sikorsky Helicopter Oscillating Bearings

Rotor heads present a difficult problem for the lubricant because of the high loads on the bearings and the oscillations of the components. AeroShell Grease 14 has been tested by Sikorsky and approved for this service.

Helicopter operators will find that AeroShell Grease 14:

1. minimizes fret corrosion
2. is a water resistant type of grease
3. meets low temperature requirements of most government specifications down to –65°F
4. permits longer periods between re-lubrication
5. is available on a world-wide basis

The Shell Aviation Representative in your area will be pleased to give you complete information on AeroShell Grease 14.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
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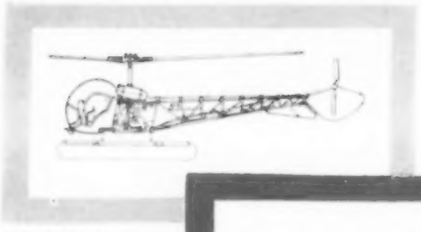
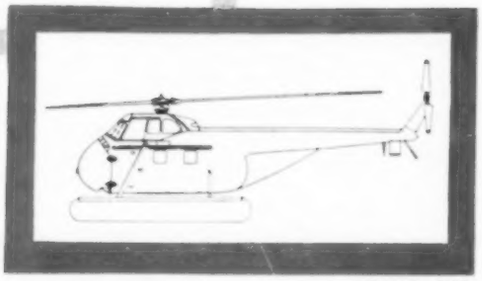
SHELL



Bell Model 47



Sikorsky S-55

Sikorsky S-58

Always first with the finest in oil field transportation

In 1949, the Bell 47. In 1954, the Sikorsky S-55. NOW, the Sikorsky S-58 adds still greater speed, range and payload to the first fleet of helicopters designed to provide a complete, flexible system of air transportation for oil field exploratory, drilling and producing operations.

PETROLEUM HELICOPTERS INC.

New Orleans and Lafayette, Louisiana
P. O. Drawer 2150 S.L.I., Lafayette

TWO HELICOPTERS FOR PRESIDENT EISENHOWER will be 4-place Bell Model 47J's, one of which is shown above. Ike's will have 3-place interior, other one will be for Secret Service. President will use the Bell primarily for White House-National Airport shuttle, avoiding complications involving ground transportation including road blocks. —(Bell Aircraft Photo.)

from Cape Girardeau, Mo. Bill Remmert hopes to open his new hangar at Pompano, Florida, during April.

HOWARD AERO, INC., San Antonio, has received an order from Republic Steel for its second Howard Super Ventura, bringing to 21 the total number of 300-mph. Super Venturas sold since May, 1956. Landis Carr, Howard vice president-general manager, said the new Republic Steel Super Ventura will have radar, Sperry A-12 autopilot and both Bendix and Collins navigation and communications equipment.

WILLIAM B. DAVIS (right) is the new deputy administrator of the Civil Aeronautics Administration. Davis was formerly director of the CAA Office of Flight Operations and Airworthiness and was promoted by Administrator James T. Pyle to be deputy administrator. He resides in Bethesda, Maryland.

W. F. (WALLY) BALZERICK (left) has been named manager of sales promotion for the commercial sales department of Beech Aircraft Corp. He joined Beech in 1953, becoming sales training director in 1955. Prior to entering aviation, Balzerick gained wide experience in lecturing, conducting sales training schools and directing sales promotion for leading auto and truck manufacturers.

DON FAIRCHILDS (right) has assumed duties as public relations director of Non-Linear Systems, Inc., of Del Mar, California. He was formerly sales promotion manager for Lear-Cal Division of Lear, Inc., Santa Monica. Non-Linear Systems develops and produces specialized laboratory equipment.

8th Annual Edition

COMING UP...

Every segment of the Aviation Industry VALUES and USES the factual and authoritative reference material presented in this annual study of Local Service Airline operations.

The pioneering local service airlines are steadily improving their air service with better scheduling, service to many more cities and towns and newer and more efficient transports. Local air service is a dynamic industry, the very grassroots pulse of America's thriving air commerce.

This vigorous expansion is accurately and graphically charted in all of its intricate details in our forthcoming 8th ANNUAL LOCAL SERVICE AIRLINE EDITION. As in years past, it will be the industry's year-round reference source.

Dynamic — thriving — vigorous — no other terms can adequately describe such local air service accomplishments as the 1956 record of 3,516,242 revenue passengers carried as compared to only 2,963,936 in 1955. . . . expansion of scheduled route mileage flown from 51.7 million in 1955 to 61 million miles in 1956. . . . extension of air service to nearly 500 cities and towns. . . . orders for new propjet, pressurized transports replacing the old DC-3 workhorse on many schedules.

It all adds up to a large and growing market for the aviation industry and its suppliers to the local service airlines — and the recognized market-place is our 8th ANNUAL LOCAL SERVICE EDITION for June.

tell your advertising Sales Story in the 8th Annual Local Service Airline Edition

Your advertising sales message in the June 1957 issue of FLIGHT Magazine is a major step in the right direction for increased sales in the months to come. Make your space reservations today. The deadline for advertising plates has been extended to May 20th.

FLIGHT
MAGAZINE

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BONANZA AIR LINES
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PIEDMONT Airlines
Southern Airways, Inc.
SOUTHWEST AIRWAYS
TRANS-TEXAS Airways
WCA WEST COAST AIRLINES

Box 750, 2700 North Haskell Ave.
Dallas, Texas

ALLISON MODEL 501 PROP-JET POWER PACKAGES for the new Lockheed Electra airliner are now being flight-tested on the Allison Convair Turboliner. The Convair formerly was powered by earlier versions of the Allison turbine.

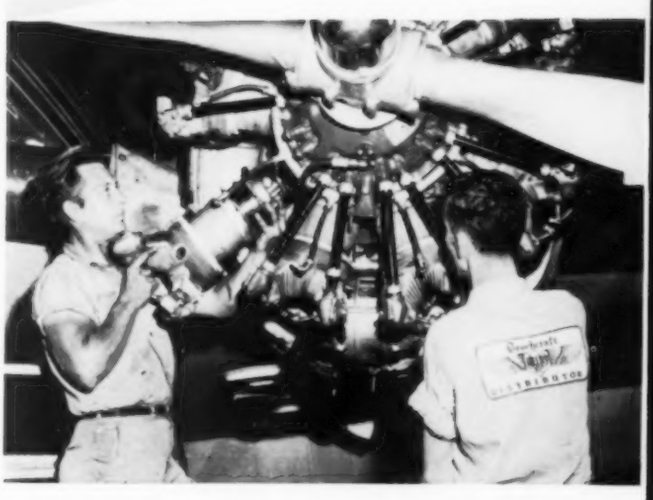
ANOTHER CONVAIR 440 FOR CORPORATION FLYING is shown above as it arrived at the L. B. Smith Aircraft ramp in Miami for complete custom outfitting for a New York business firm. Cockpit of new Convair is pictured at right. It will have 20 seat belts in 3 compartments. Fore and aft sleeping compartments will have two 3-place berthable sofas each. Center compartment will have circular divan, double sets of seats with removable conference table; two swivel seats with cabinet table between, and two swivel seats with storage ottoman between them. The Charles Butler-designed interior will excel in storage space and LBS will also install radar, Bendix engine analyzer, auxiliary power unit, Zero Reader, autopilot and complete oxygen system.

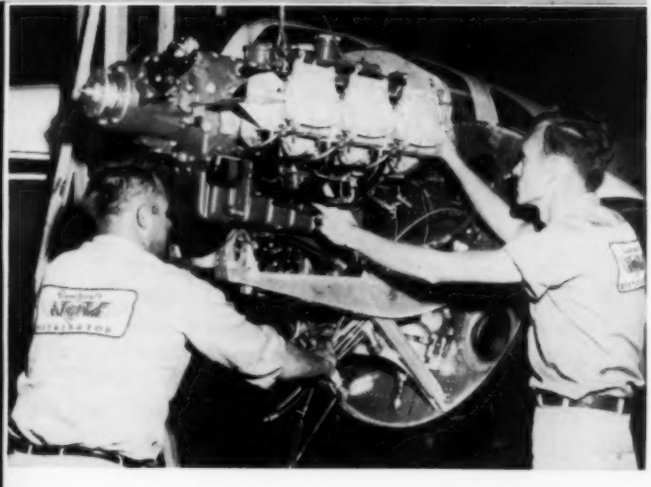
—(L. B. Smith Photos.)

DALLAS AERO SERVICE has completed, is working on and has scheduled a total of 17 Super 680 Aero Commanders for the Lycoming GSO-480 re-work program being sponsored jointly by the factory, Lycoming and Aero Commander distributors — at no cost to owners. This re-work includes installation of anodized pistons, ni-chromed exhaust valves, authorized Bendix carburetor overhaul including new coated diaphragm, new-type throttle shaft bushing and larger main metering jet. DAS is also featuring installation of Bendix fuel flow meters for customers who desire them for precise control of fuel flow for most efficient operation. . . . Other interesting Dallas Aero Service work in March included several Lodestar clean-up modifications for improved performance (stabilizer angle of incidence change, fairing to smooth out hump on empennage, installation of Convair wheels and brakes, short stacks, belly installation of Janitrol heaters, flush antennas and other improvements). Among Lodestars receiving all or partial improvements were those of Russell Firestone, Jr., Dallas, piloted by Bill Powell; McDermott Construction of New Orleans (two Lodestars), piloted by Bill Dugan and Chuck Forrester; Ray Smith Transport of Dallas, piloted by Al Phillips; and Renwar Oil of Corpus Christi, flown by Dick Barker. . . . DAS has obtained approval for Aerojet-General Jato installations for DC-3's, Beech 18's and Lodestars and is working on approval for the Dove, which will receive two Jatos of 250 lbs.-thrust each and weighing a total of 100 lbs., which would be offset by a 100-lb. increase in gross weight. First Dove Jato installation will be for Aerojet-General's de Havilland. . . . DAS has added the Federal tubeless autopilot distributorship and has expanded its custom interior department to handle complete turnkey jobs, including all seat, cabinet and table production. Recent complete Dove interiors include those for Kramer Tractors, Regina; Crothers Caterpillar of Toronto; Sun Oil of

Maximum Performance through better Maintenance

J. D. REED COMPANY





Today's modern aircraft was engineered and designed to give an unlimited number of years service. Through proper maintenance your aircraft can offer the maximum performance that was built into it when new. But the value and performance of your aircraft are totally dependent upon the quality service and maintenance it receives.

At the J. D. REED COMPANY you have a great deal to gain from the experience of our factory trained technicians who have made a career servicing and maintaining aircraft like yours. We can prevent big troubles by spotting little troubles early. We can keep the performance of your aicraft up — operating costs down.

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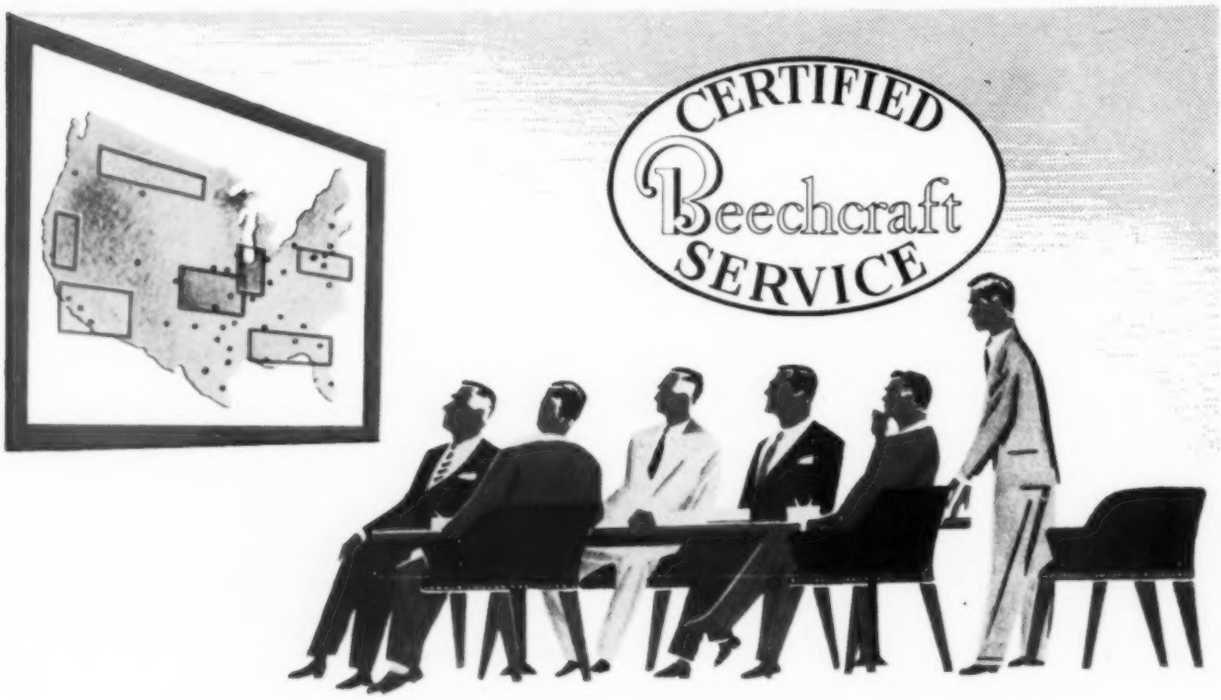
J.D. REED CO. INC.
SALES SERVICE
Beechcraft
DISTRIBUTOR
MUNICIPAL AIRPORT
HOUSTON, TEXAS



keep your Executive Team at full strength

The "Executive Teams" of thousands of firms are strengthened by the rugged dependability of their Beechcrafts. The day in-day-out performance of these aircraft allow more executive time for urgent business . . . time for important conferences in far-away places . . . more time to explore new fields . . . more time for pleasure and relaxation.

We can help keep your team at full strength by insuring against loss of executive time by out-of-service aircraft. Servicing and maintenance of the "Business Fleet" is a specialty of our factory trained service staff. Let us check your airplane today . . . We will also be glad to explain our regular maintenance plan for greater safety — lower costs.

AIRCRAFTCO, INC.
New Municipal Airport
Wichita, Kansas

AIRCRAFTSMEN, INC.
Will Rogers Field
Oklahoma City, Oklahoma

ALAMO AVIATION, INC.
Municipal Airport
San Antonio, Texas

ANDERSON AIR ACTIVITIES
General Mitchell Field, Milwaukee, Wisc.

ATLANTIC AVIATION CORP.
- Teterboro Airport
  Teterboro, New Jersey
- Logan International Airport
  East Boston, Massachusetts
- International Airport
  Philadelphia, Pennsylvania
- New Castle County Airport
  Wilmington, Delaware

BUTLER CO., AVIATION DIVISION
Municipal Airport, Chicago, Ill.

CURREY SANDERS AIRCRAFT CO., INC.
Downtown Municipal Airport, Shreveport, La.

CUTTER-CARR FLYING SERVICE, INC.
West Mesa Airport, Albuquerque, New Mexico

GRAY AIRCRAFT SVC. CO., INC.
D. A. Cody, Service Manager
Love Field, Dallas, Texas

ELLIOTT FLYING SERVICE
Municipal Airport, Davenport, Iowa

LOPEZ GRACE AVIATION, INC.
Building No. 3 and No. 18
Broward County International Airport
Fort Lauderdale, Florida

J. D. REED CO., INC.
Municipal Airport, Houston, Texas

ROSCOE TURNER AERONAUTICAL CORP.
Municipal Airport, Indianapolis, Ind.

TEXAS AVIATION CORPORATION
G. K. Roberts, Pounds Field
Tyler, Texas

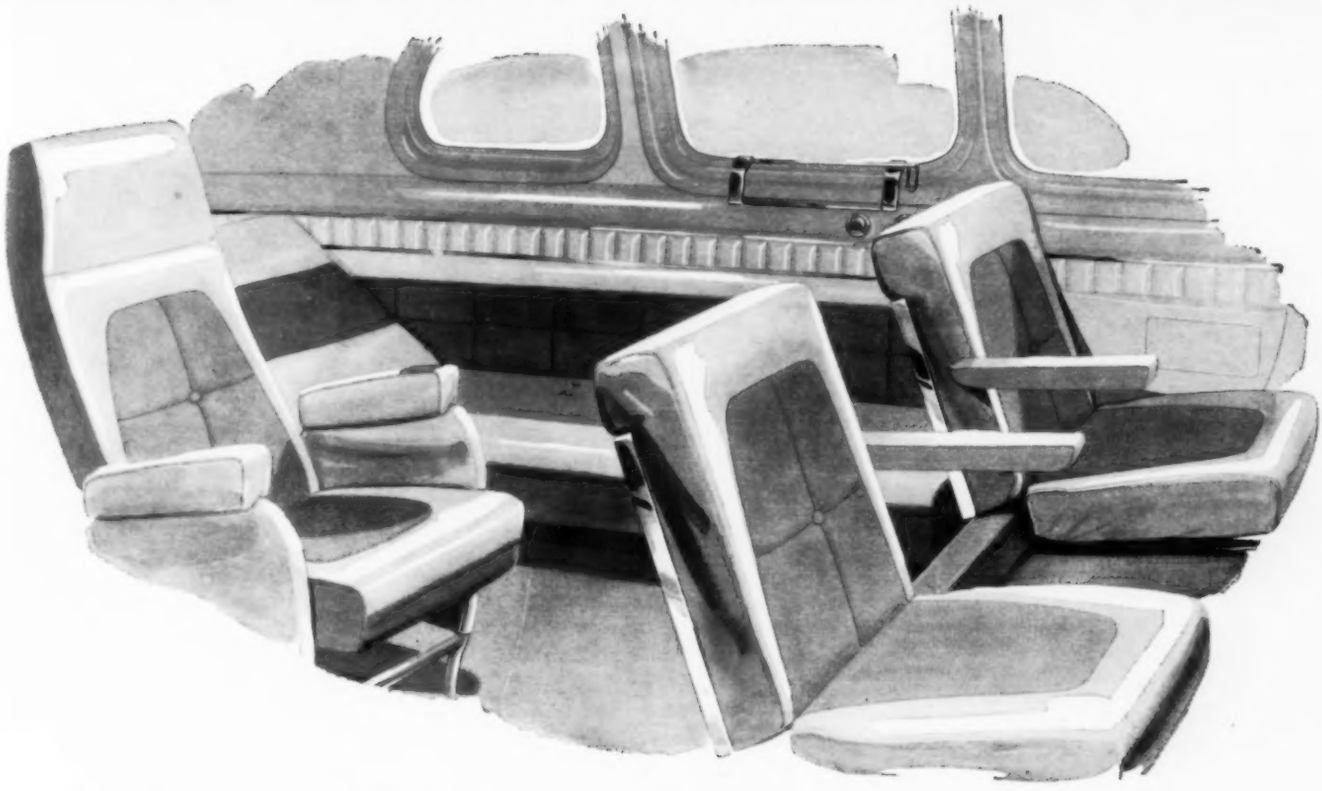
TOPEKA AIRCRAFT SALES & SERVICE
Municipal Airport, Topeka, Kansas

TRADEWIND AIRPORT CORP.
Tradewind Airport, Amarillo, Texas

TULSAIR DISTRIBUTORS, INC.
Hangar 8, Municipal Airport, Tulsa, Oklahoma

Put Your BEECHCRAFT in BEECHCRAFT Hands

The '57 Beechcraft Twin-Bonanza – Best Ever Built!



SIX WAYS TO *RELAX*

Here's relaxation . . . drama . . . styling . . . never before offered in aviation! *Six* different interior seating arrangements, including a six-foot ten-inch lounge, are yours in the new, fast, supercharged Beechcraft Twin-Bonanza for '57. Brilliant design in the new Twin-Bonanza provides speeds up to 240 miles-per-hour, a range of more than half a continent, "safety capsule" protection for all six cabin occupants who are *above* and *behind* whirling propellers. Visibility is unmatched — and automatic foldaway stairs provide easy entrance and exit without ducking, stooping or stretching.

You'll like Beechcraft's advanced concept of business travel . . . see your Beechcraft distributor or dealer for the most *appealing* airplanes in the skies and for a finance plan that will most *comfortably* fit your business operation.

The Twin-Bonanza welcomes comparison!

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Calgary and Vernon Mayfield of Houston.

PACIFIC AIRMOTIVE CORPORATION'S Burbank Aircraft Division has delivered Sharon Steel's Pennsylvania-based Lodestar after installation of PV-1 type landing gear and flap selector system, auxiliary electric hydraulic pump, one-piece windshield, PAC's proprietary flush dump chute, PAC's nose pitot, dual fuel system. Other work included x-ray of landing gear and tail section, rewiring, service bulletin 114, complete paint job and weight and balance. While the ship was at PAC, Aircraft Tank Service stripped and resealed all fuel tanks and Aero Interiors installed a new deluxe interior. Pilots are T. A. Jones and A. M. Wilkins. Chief of maintenance is W. D. Gibbs.

NEW 66,000-SQ. FT. HANGAR AT NEWARK AIRPORT now houses all of service and maintenance facilities of Newark Air Service and handles aircraft up to DC-6 size. The firm has spent over $600,000 expanding to meet needs of corporate flying growth at the New Jersey field, only minutes away from Manhattan. NAS also has machine, sheet metal and electronic shops, a parts warehouse and an ad building including pilot information center. C. William Drake, executive vice president, said he has expanded his staff by 25 per cent.
—(Newark Air Service Photo.)

TWO NEW IDECO HANGARS JOINED BY LOUNGE, OFFICE AND SHOPS are being erected for Lane Air Services at Columbus, Ohio, adjacent to the site for a new terminal building. The new hangars measure 142 by 120 ft. and 172 by 96 ft. with 20-ft. doors and tail doors for Convair-size planes. Headed by Foster Lane, the firm is Cessna distributor and provides refueling services for American, Eastern, Lake Central and 13 non-skeds. The Dresser-Ideco hangars were designed by Holroyd Associates of Columbus.
—(Dresser-Ideco Drawing.)

SPACIOUSNESS OF 17-PASSENGER CORPORATE DC-3 CABIN is emphasized in this view inside the latest Douglas conversion performed by Executive Aircraft Service of Dallas. Headlining, upholstery and curtains are silk in tones of gray and charcoal, with black and white carpet. Divans convert into oversize beds. Picture windows add to spacious "look."
—(Executive Aircraft Service Photo.)

Roy Weiland, Mellon Bank's chief pilot, has taken delivery of their Lodestar from Pacific Airmotive-Burbank, following installation of PAC's short stacks, 50,000 BTU heater in each nacelle, 100-hour inspection and relicense. A complete tank reseal was performed by Aircraft Tank Service. . . . Lockheed 221B, one of several Lodestars operated by Bechtel Corporation, was in the PAC-Burbank shops for overhaul of the main landing gear and tank seal. Pilot is Vic Voit. NBAA representative is chief pilot A. K. Roden. . . . Vinnell Company's Twin Beech, piloted by Charles Eaton, is back in service after engine change, control surface recovering and other maintenance by PAC-Burbank.

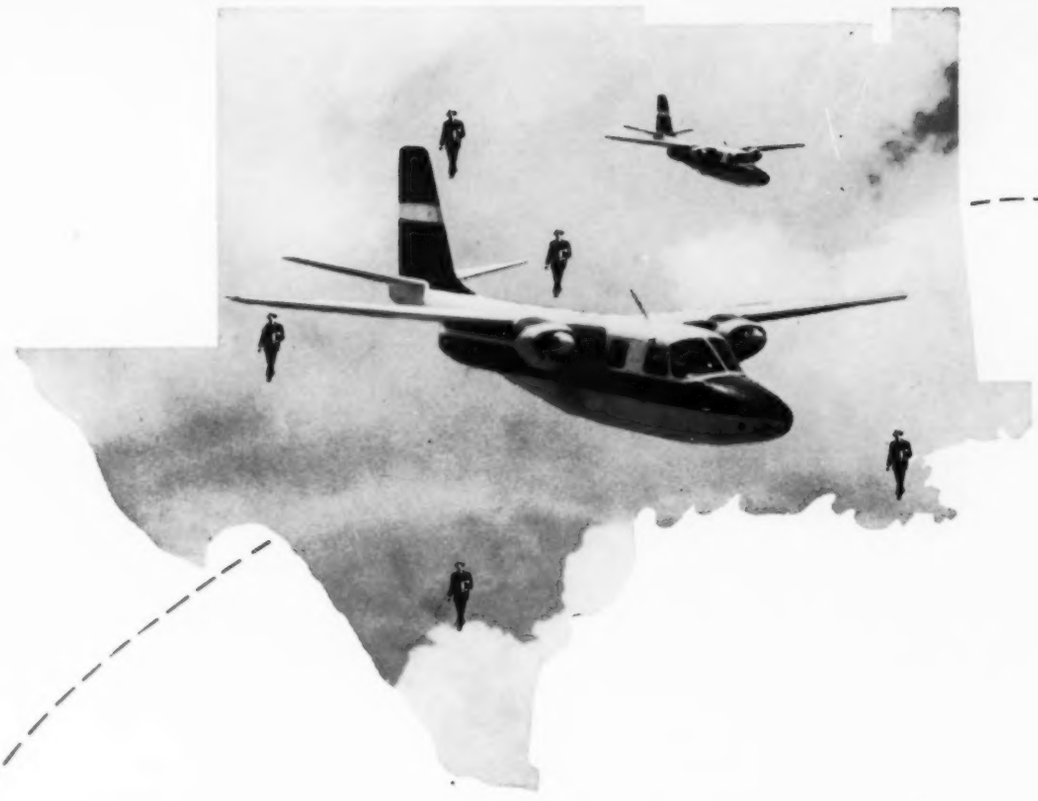
AERO CORP. OF ATLANTA is performing an 8,000-hr. overhaul and general reconditioning on an Aviateca Airlines DC-3 flown up from Guatemala City. It will also get a double engine change. . . . The busy Atlanta mod center last month began delivering the first of 12 Vought Corsairs it is remanufacturing and equipping for the Argentine Air Force. . . . President Tom Lombardo has announced the appointment of Thomas R. Foster as vice president of Aero Corp. of Atlanta. He was formerly assistant to the president of Southern Airways, director of maintenance for Southern Airways, sales manager for Luke Harris Industries and purchasing agent for Capital Airlines. He will have responsibility for Aero's contracts division.

SOUTHWEST AIRMOTIVE at Dallas recently completed a rework of a Lodestar for Lockheed's Georgia Division. . . . George H. Kelley, Southwest's senior employe with 23 years of service, has been promoted to be the firm's chief engineer. He was for many years chief of the SAC aircraft shop.

PACAERO ENGINEERING CORP. of Santa Monica is now offering certain Learstar modifications on Lodestars — Learstar wheel and brake kit; empennage modification including new bulkhead in tail area; rudder spring tab system; radar installation; installation of 1,350-hp. R-1820-56A engines to permit 1,350 hp. for take-off with either rudder spring tab installation or the empennage installation.

A NEW CORPORATE AIRCRAFT MODIFICATION AND OVERHAUL BASE at Galveston, Texas, will be announced soon by Dallas Airmotive, which will operate the aircraft center in addition to its large engine overhaul plant in Dallas.

TAKE A HEADING FOR READING, Pennsylvania, is the current



AERO COMMANDER DISTRIBUTORS

. . . IN THE SOUTHWEST AREA

SAN ANTONIO
Commander Sales Company
Hangar 3
International Airport

NEW ORLEANS
Trans-Aire Corporation
Pan-Air Building
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DALLAS
Brown Aero Corp.
3300 Love Field Drive

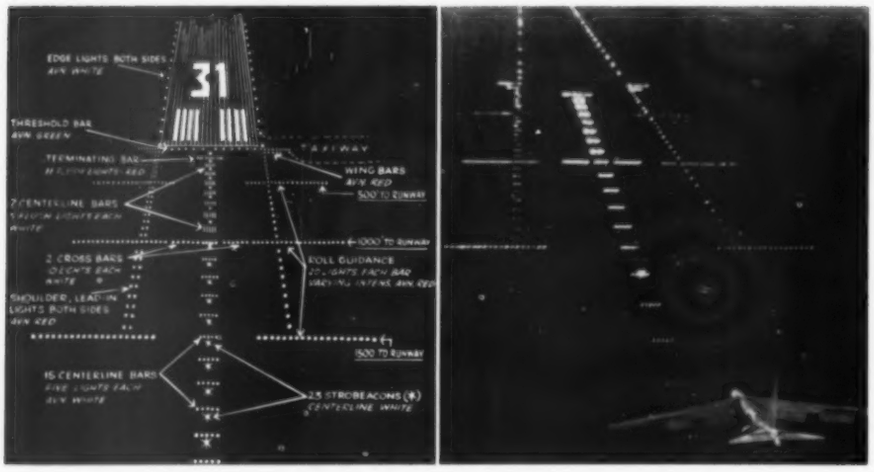
MIDLAND
West Texas Flying Service
Midland Airport

OKLAHOMA CITY
Downtown Airpark Inc.

See the Aero Commander Distributor in your area for information, a demonstration or factory approved service.

. . . NOW TWO GREAT AERO *Commanders*

560-A · 680-SUPER



FEWER MISSED APPROACHES IN BAD WEATHER are claimed for a new Sylvania electronic flash approach lighting system installed at March Air Force Base, California. Twenty-three strobe-beacons flash in sequence twice a second, pointing toward runway with effect of giant tracer shells.

100 DC-3 Maximizer Kits Sold

AIRSEARCH Aviation Service at Los Angeles International Airport has sold nearly 100 DC-3 Maximizer Kits since it annuonced the Ben O. Howard-developed "package" (FLIGHT MAGAZINE, August, 1956) on a money-back guarantee to increase DC-3 cruising speed by 20 mph. without additional horsepower. Nobody has asked for a refund yet.

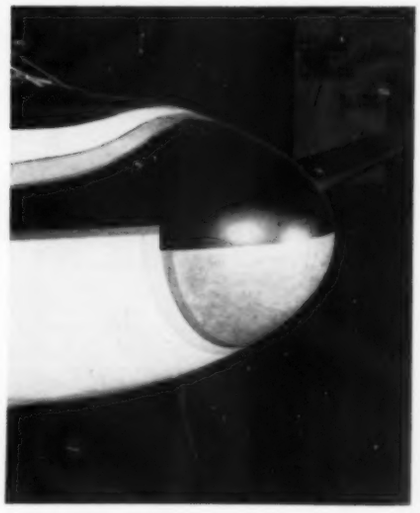
Jack O'Brien, AiResearch Aviation Service general manager, and Howard (right) are shown above with an AiResearch Douglas equipped with new Maximizer wheel-well doors. These were being CAA certificated last month when we visited the AiResearch ramp. CAA approval had been obtained for all other Maximizer components before sales delivery began — modified nose cowl, new engine baffles, Siamese stacks, modified oil cooler fairing and tail-wheel closure. The kit sells for $14,850 and airlines, as well as corporate DC-3 operators, are installing it for higher speeds and lower operating costs.

The Maximizer guarantee is for a 20-mph. speed gain at 10,000 feet at normal cruise power, which is 600 hp. per engine for a DC-3 powered by P. & W. R-1830-92 engines. Operating experience shows that this speed gain has been translated into a net savings of approximately 10% in DC-3 operating costs, according to O'Brien. In other words, 60 hours are cost-free out of every 600 hours of operation — the Maximizer pays for itself. Howard explains much time and research was spent in perfecting this modification before the components were placed in production. The complete Maximizer kit installed adds less than 60 lbs. to the weight of the airplane. In addition to providing more speed at no increase in power, it increases cooling efficiency and engine reliability, reduces maintenance requiremnts and lessens buffeting and vibration.—T. A.

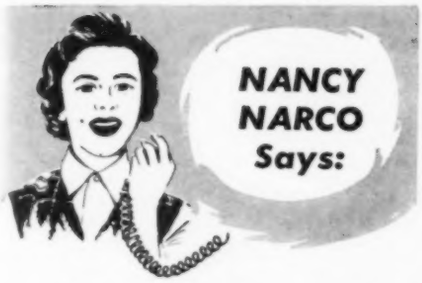
watchword for pilots, crews and owners of more than 800 business planes expected to attend the 8th Annual Maintenance & Operations Meeting on June 1, sponsored by Reading Aviation Service, Inc. Sime Bertolet, president, says he has planned for up to 1,000 visiting planes and 1,500 to 2,000 guests for the 1-day get-together which has become an institution as well as an opportunity for business and private aircraft users and operators to become acquainted with newest techniques and products to improve their equipment.

A total of $6,000 in cash prizes will be awarded for the 16 airplanes judged best in three categories and four weight classes — these are the famous Reading Aviation Awards for high standards of aircraft excellence. Last year's top prize winner was the Alcoa DC-3 from Pittsburgh. Business planes with outstanding equipment, wherever based, are invited to compete. In addition to the judging and forums on maintenance and operations, with George Haddaway, FLIGHT MAGAZINE, as master of ceremonies, there will be elaborate displays of modern planes and equipment, including the new lightweight RCA radar, and a free and elaborate buffet luncheon will be served.

AMERICA'S LARGEST AND MOST COMPLETE EXCLUSIVE EXECUTIVE AND PRIVATE AIRPORT will be completed in July at Dallas, about 8 miles north of Love Field in the Addison community. Called "Addison Airport," it will cost $2,291,000, will have a 4,500-ft. paved runway 100 ft. wide, a 5,000-sq. ft. terminal building with restaurant and office space, 150 T-hangars, night lighting and 24-hr. operation. Six hangars are going up, two with



RADOME FOR BEECH 18 TWIN developed by Chamberlain Aviation Corp., Akron, Ohio, is supplied in kit form and requires no structural changes. It attaches directly to the forward bulkhead, replacing original nose door and providing short waveguide run.



Thanks are due the boy from Akron who wrote to say his Omnigator was off nearly 4° going from Rochester to Albany, N. Y. Seems he was way up, on oxygen, and held the outbound radial for the first 120 miles, but when he switched to the TO course on Albany he had to re-center the needle. So, how come?

Variation, that's how come. Remember Magnetic Variation? Well, these omni stations are all set so their North zero is *Magnetic* North. I looked it up; the variation at Rochester is 9° west, at Albany, 13°. That's why your outbound and inbound courses don't match up.

So far, the only squawk I've received about that new Omnigator Mark II came from a guy in Connecticut who wrote to say it was fine, but he hadn't been able to tune in the Newark range. Guess he'll just have to wait until they put in a VOR at Newark, and use Caldwell or Colt's Neck in the meantime.

At the rate the CAA is plugging in the new omni stations it won't be long until you can drive a car coast to coast on omni. And this brings up a point. Besides needing a little hunk of real estate, every omni station must have a frequency that doesn't interfere with any other omni station in the same general area. They don't put Dallas omni and Fort Worth omni on the same frequency, for example (got enough trouble between Cowtown and Big D as it is). Matter of fact, they don't even put them on adjacent channels, like 114.5 and 114.6 mc. On some omni sets it would be hard to tune one signal in the presence of a strong unwanted signal only a tenth of a megacycle away.

That's why sharp tuning on an omni receiver is important. Try it on your next trip. Get high enough over one omni station to reach way out and pick up the little, weak signal from the nearest station one or two tenths off the frequency of the station you are over. If you can tune it in, and the needle holds still on a bearing, brother, you've got an Omnigator!

The boys tell me that's called "selectivity". I'll take their word for it. All I know is, if they keep putting omnis in at every crossroads, we're going to need it – whatever it's called.

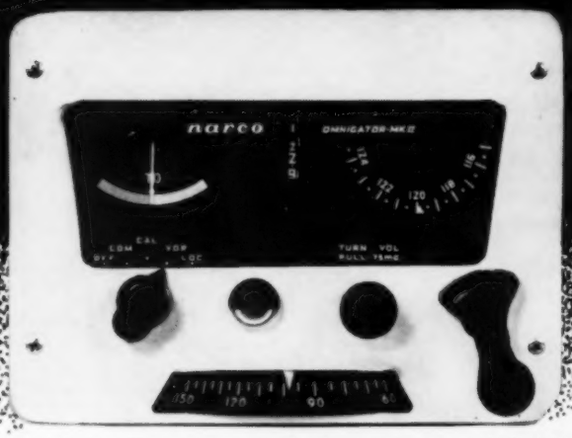
Happy megacycles,

Nancy

NARCO • Fort Washington, Pa.

Announcing . . . the New

narco OMNIGATOR MARK II



More channels, increased transmitting power, tripled band width, whistle-stop tuning, increased speaker output—all these up-to-date features plus many others are offered in the sensational new Omnigator Mark II. Printed circuits plus the most advanced electronic refinements make all this added performance possible in the same compact single-package navigation and communications unit which has made the Omnigator the most popular, the most respected, the most accurate (proved by government test) of all popular business-plane Omnis.

NOW

with 27 Channels

NO OTHER RADIO GIVES YOU SO MUCH IN A SINGLE, COMPACT UNIT

27 CHANNELS give you ample crystal capacity for all normal communications — VFR or IFR.

TRANSMITTER POWER INCREASED; BAND WIDTH TRIPLED.

DOUBLED AUDIO OUTPUT.

SUPER ACCURATE VOR navigation. Factory-certified to be accurate within 2 degrees.

LARGE SCALE COURSE SELECTOR permits accurate course selection to the exact degree.

IMPROVED COURSE INDICATOR with ideal sensitivity, combined with new type To-From indicator.

ILS LOCALIZER reception for instrument approaches.

75 Mc MARKER BEACON RECEIVER.

VHF RECEIVER 108 to 127 mc for crystal clear reception.

Plus

BUILT-IN WHISTLE-STOP TUNING!

Pioneered by Narco four years ago, tunes your receiver precisely, positively to your transmitter frequency for simplex communications with towers, control centers, Unicom.

See your Narco dealer or write for new brochure.

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NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

AUTHORIZED
Cessna
SERVICE

These Authorized Stations Feature Flat-Rate Service

Aircraft Sales Company
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Clinton Aviation Company
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Cruse Aviation, Inc.
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and Clover Field Airport
Houston, Texas

Dal-Tex Aviation, Inc.
Highland Park Airport and Love Field
Dallas, Texas

Dixie Air Associates, Inc.
Municipal Airport
Memphis, Tennessee

Executive Aircraft Company
Municipal Airport
Kansas City, Missouri

Hair Flying Service
Harding Field
Baton Rouge, Louisiana

Howard Aero, Inc.
Service Division
International Airport
San Antonio, Texas

Poelman Aircraft Co.
New Orleans Airport
New Orleans, Louisiana

Ragsdale Flying Service
Municipal Airport
Austin, Texas

Kenneth Starnes Aviation Service
Adams Field; Little Rock, Arkansas

Southwestern Skyways, Inc.
Municipal Airport
Santa Fe, New Mexico
and Ogden, Utah

Sunny South Aircraft Service, Inc.
Broward International Airport
Fort Lauderdale, Florida

Walston Aviation, Inc.
Civic Memorial Airport
East Alton, Illinois

WestAir, Inc.
Municipal Airport
Abilene, Texas

Yingling Aircraft, Inc.
Municipal Airport
Wichita, Kansas

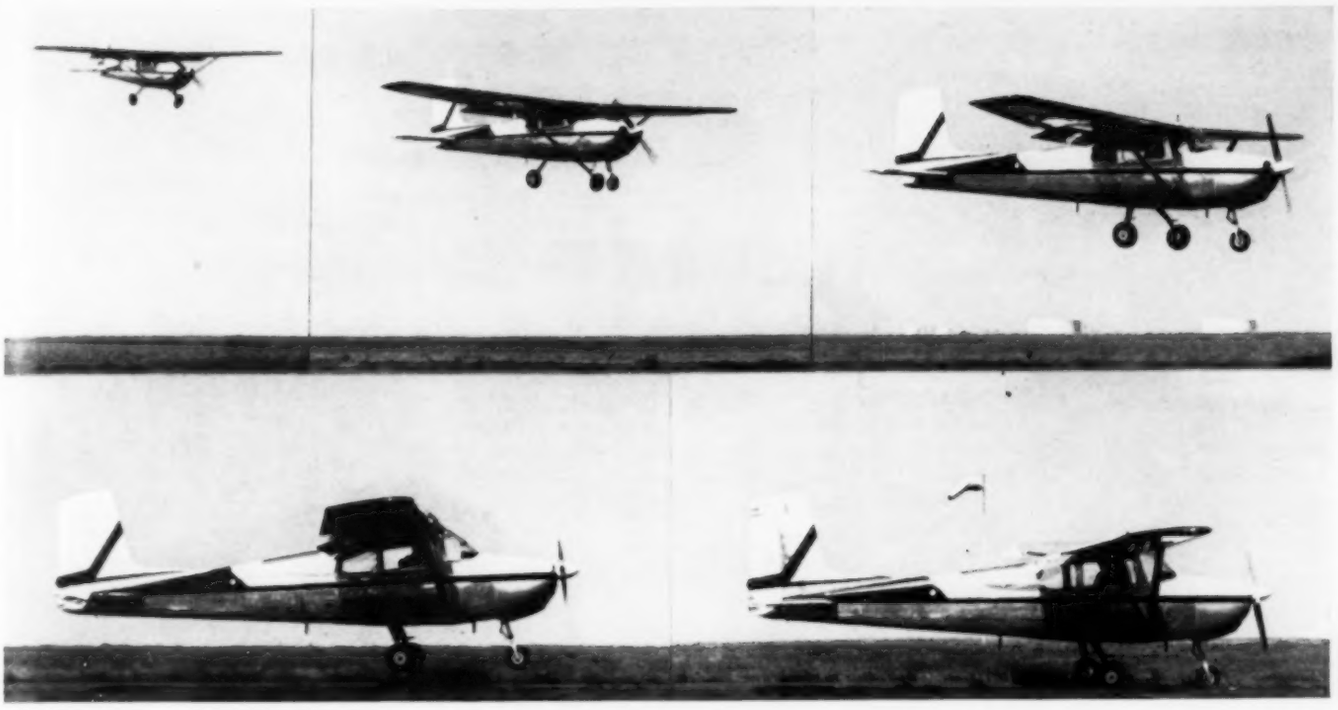
SERVICE SATISFACTION

SMILING SERVICE is what you expect and always receive when our Authorized Cessna Service Stations solve your maintenance needs! We furnish factory skills, factory equipment and factory satisfaction. Cessnas are our specialty . . . and we follow a policy of giving Cessna users a little more, a little better service — LIKE OUR FAMOUS 1-2-3 CESSNA FLAT-RATE SERVICE!

1 You get an accurately quoted price and time-required quotation based on hundreds of job studies covering virtually all maintenance needs.

2 You get genuine Cessna parts and factory-trained workmanship.

3 You save money and time and we stand behind every job for your fullest satisfaction.



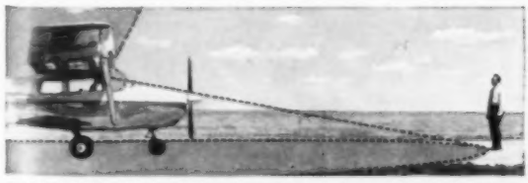
BIGGEST PLANE IN ITS CLASS—'57's BIGGEST VALUE ▲

EASY DRIVE-IN LANDINGS...

all-metal construction...120% more flap...best forward visibility—4 of the 60 extra reasons to see the big new Cessna 172 for '57!

1. Easy drive-in landings with wide-span Land-O-Matic safety. Cessna's revolutionary new landing gear makes all landings, even cross-wind, easier. Combines with Cessna's tapered high wing to give you a new kind of stability and handling ease—on the ground and in the air!

Let your Cessna dealer prove it and show you feature after feature offered only by the big Cessna 172 for 1957 and by no other airplane priced so low! $8,975 (with std. equip.) f.a.f. Wichita. See Yellow Pages of telephone book or write CESSNA AIRCRAFT CO., DEPT. FM-6, Wichita, Kansas.



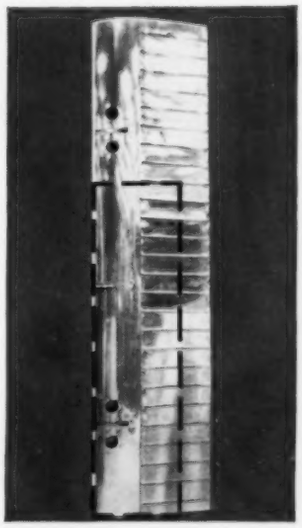
3. Best forward visibility gives best safety view in its class. Largest unobstructed wrap-around windshield (1200 sq. in.) affords widest visibility down the runway and in the air! Shock-mounted instrument panel greatly reduces vibration, assures longer instrument life. Powerful 145-H.P. Continental engine gives you 6-cylinder smoothness, holds world's record for endurance flight...1124 hours—46 days!

2. "Ageless" all-metal construction. Provides extra safety and rugged protection against rain, sun, and freezing—as well as dirt and gravel of rough fields. Assures years-longer life, significantly higher resale value...and the Cessna 172 is the only all-metal airplane in the low-price field!

Inquire about Cessna Lease Plans

Cessna

4. 120% more area with exclusive Para-Lift flaps. They float you in to the runway, twice as slowly as a man in a fully opened parachute . . . lift you out of shortest fields easily . . . clearing a 50′ obstacle in seconds after take-off. Along with Land-O-Matic gear, give you slowest, smoothest landings of any airplane in its class. 4-position fingertip control.



4 GREAT CESSNAS 172 180 182 310 THE COMPLETE AIR FLEET FOR EVERY BUSINESS NEED

26,000-sq. ft. of floor space for Delhi-Taylor Oil Company and Collins Radio. Management officials taking part in last month's ground-breaking at the site included John Murchison, W. T. Overton, Toddie Lee Wynne, Jr., W. D. De Sanders and James I. De Loach. Henry Stuart is vice president and manager. Addison Airport will handle business planes including Convairs.

PACIFIC AIRMOTIVE has announced dates for Pratt & Whitney engine forums at four cities as follows: Denver, Cosmopolitan Hotel, May 14; Burbank, Ambassador Hotel, May 17; Oakland, Hotel Claremont at Berkeley, May 20, and Seattle, New Washington Hotel, May 22.

A REGIONAL SERVICE CLINIC for Narco Sapphire communications equipment personnel from major Narco sales and service organizations in New England and Middle Atlantic states will be conducted on April 24 at Narco's new plant at Fort Washington Park, Pennsylvania. G. F. Quinby, Narco sales manager, said Bert Rashkow, sales engineer, will direct the all-day session.

REMANUFACTURING OF EARLY-MODEL BEECHCRAFT ARMY L-23 TWIN-BONANZAS is covered by a new $1,710,000 contract received by Beech Aircraft Corp. at Wichita. Under it, a large number of L-23A and B units will be rebuilt to Army D configuration with super-charged 340-hp. Lycoming GSO-480 engines and delivered, beginning in September, as new airplanes. They will be equipped with new electronics, accessories, interior styling and a third cabin window on each side.

ANOTHER CASE OF COPTER VERSATILITY is pictured here as an Ostermans Sikorsky lines up and lowers a bulky TV directional antenna atop a 240-ft. tower in Stockholm, Sweden. It was physically impossible to assemble the complex parts of the unit on the tower. But the copter hoisted it atop the 20-story tower in 3 mins.

AVIATION MECHANICS WOULD BE CALLED "TECHNICIANS" under a request to CAA and CAB by the National Aviation Trades Association, whose president, Galen Bertram, says the term "mechanic" is antiquated and fails to reflect the advanced technical developments in aviation which today require more training and higher skills on the part of maintenance personnel.

ACCURACY TESTING OF FIRE-WARNING, WING ANTI-ICE AND CYLINDER HEAD TEMPERATURE SYSTEMS is possible with the Tempcal Tester produced by B. & H. Instrument Co., Ft. Worth, Texas. The Tempcal's performance of five basic services covers (1) functional test of fire detection and wing anti-ice systems; (2) test of calibration and accuracy of thermal switches installed on the aircraft; (3) bench check of calibration and accuracy prior to installation or in production; (4) check of cylinder-head thermocouples and their circuits, and (5) functional check of continuous wire systems including the wire, the amplifier, relay and cockpit indicator.

Instantaneous Acceptance!

TACTAIR T-3 THREE-DIRECTIONAL AUTOPILOT

THE TACTAIR T-3 has met with instantaneous acceptance and approval. Those who have flown it are amazed at its smoothness, accuracy and positive automatic control. Those who have installed it are surprised at its simplicity and maintenance-free features. Those who have bought it and are now using it are amazed that such perfection in automatic flight can be bought for $2,395, complete with installation kit. Now you can add all the advantages of automatic flight to your aircraft with the confidence that it will provide dependable service at reasonable cost.

HEADING LOCK. Just set course desired on upper compass card. T-3 automatically turns airplane to course, holds it to exact degree.

HERE'S WHY

YOU'LL WANT THE TACTAIR T-3

The Tactair T-3 three-directional autopilot weighs only 7.3 pounds. It operates pneumatically from the aircraft's own vacuum pump—no tubes, no electric motors, no warm-up, no power drain. Its EXCLUSIVE HEADING LOCK lets you fly the exact course you want. Perfect for VOR or ILS tracking. Pitch knob controls climb or descent. Turn knob controls turns up to standard rate.

CAA approvals now completed or pending on all leading makes of business aircraft. See your Tactair distributor or write for brochure.

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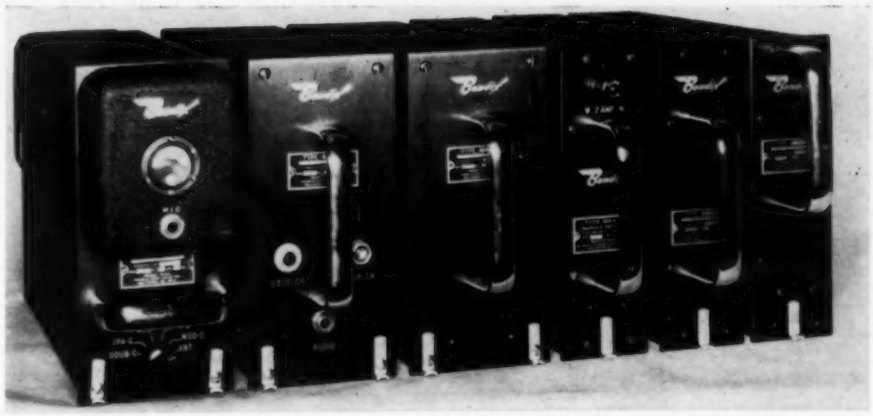

HOWARD JOBMASTER

(Continued from page 48)

version with the conviction of 30 years of piloting. That experience includes flying the Alaskan bush in the old Boeing B-1E boat and flying Boeing 40-B4's and 247's in the struggling days of United Air Lines. Since then he has piled up long hours in Boeing P-12, B-17, B-29, B-50, 377 Stratocruiser, B-47, B-52, KC-135 and 707 aircraft — plus continued off-hours flying in his Howard and other commercial floatplanes. People around Seattle, Puget Sound and British Columbia usually listen when Scotty has something to say about airplanes. They admire his Jobmaster.

It is the answer to the fisherman's prayer, for example, having five or six hours of fuel, enough horsepower for averaging 150 mph., ability to operate from high-elevation lakes and a cabin big enough for five or six people on folding seats or a lot of cargo.

"I can load standard 2.6 by 6.8-ft. house doors in the Jobmaster, or lengths of 10-ft. pipe, or even four 55-gal. gas drums in there," Scotty told us on a recent rainy-day visit to Renton. He has perfected a new left-side cabin door 36 ins. high and 42 ins. wide with a tapered corner.

Gross for the Jobmaster on floats is currently 4,800 lbs. but Scott expects approval for 5,076 lbs. soon. Useful load now is 1,400 lbs. but in the original certification tests he said it handled satisfactorily with a 1,000-lb. overload. Fuel supply is 120-150 gals.

He has completed three conversions to floats metalizing the fuselage on two of them by using welded lugs and clamps to fasten the skin to the tubular frame so that air space was left to facilitate hosing out the fuselage to avoid salt water deposits.

The price for a Jobmaster, including airplane, new Edo 4580 floats, newly-majored Wasp Junior with all bulletins complied with, new low-frequency transceiver and a Narco omni or equivalent, is $24,950 complete. For those wishing to do their

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HORTON & HORTON CUSTOM WORKS INC.

THE 5,000TH BEECHCRAFT BONANZA was delivered last month by Beech Aircraft to O. George Tobey (above), Hartford, Conn., with a silver key and chain from Mrs. O. A. Beech. This was Tobey's second Bonanza, purchased from Atlantic Aviation. The Bonanza entered production in 1947.
(Beech Photo.)

THE 500TH TWIN-ENGINE CESSNA MODEL 310 was delivered last month by Frank Martin (left) Cessna Aircraft Company marketing manager, to Gustavo Mailhios of Montevideo, Uruguay, rancher.
(Cessna Photo.)

own conversion, Scott is manufacturing a CAA-approved kit which sells at $3,500 and includes struts, wires, fuselage fittings, tail fins, left-side cabin door and complete prints and instructions for installation. With a kit, a user can install his choice of Edo 4580, 4665, 6235 or 6470 floats on his own Howard, obtaining the floats elsewhere.

Scott, whose Jobmaster Company's address is 1016 First Avenue South, Seattle 4, Washington, issues his Howard Jobmaster seaplane specifications as follows:

Span, ft.	38
Wing Area, incl. ailerons, sq. ft.	210
Length, ft.	30
Wing Ldng., lbs.-sq. ft.	20.7
Pow. Ldng., lbs.-hp.	10.9
Gross Wt., lbs. (5,076 expected soon)	4,800
Empty Wt., lbs.	3,400
Useful Ld., lbs.	1,400
Cr. Spd., 70% hp., 7,000 ft., mph.	150
Cr. Range, with res., mi.	500

Scotty has dramatic proof that the Howard is as rugged as it is reputed to be, with its approved 270-mph. diving speed and freedom from restrictions for acrobatics on wheels.

"Our second conversion went through an experience proving its rug-

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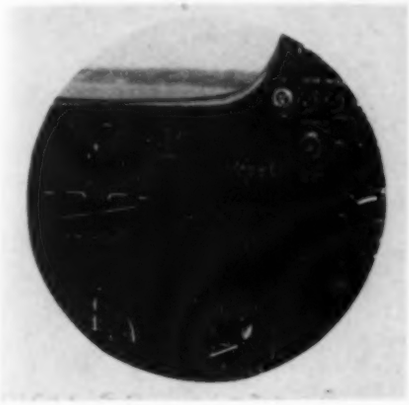
MITCHELL AIRBOY CO-PILOT becomes 3-axis autopilot with addition of new pitch control unit on a 4 by 6-in. plate bolted between firewall and instrument panel with clamp fastened to the yoke. Clamp connects two universal joints to longitudinal rack, operated by servo motor.
—(Mitchell Industries Photo.)



THE 5,000TH PIPER TRI-PACER was delivered last month to John M. Brittingham (left), Albany, Texas, rancher, by Jack Robinson (center), Ft. Worth distributor, and W. T. Piper (right), the manufacturer.
—(Piper Aircraft Photo.)

gedness," he said. "William E. Boeing, Jr., bought Jobmaster No. 2 and, while his pilot, Mira Slovak, was en route to Alaska, the engine quit over Queen Charlotte Sound, exposed to the sea and one of the roughest and toughest spots on the route north. A dead-stick landing had to be made in waves running 6 to 8 ft. high and Slovak thought the Jobmaster would go to pieces when he hit.

"But it took the beating and floated okay. A fish boat came to the rescue within 45 mins. just as the Jobmaster was about to be blown up on a rocky beach. It towed the Jobmaster by a line 32 miles through heavy swells to Namu, B. C., and protected water. During the engine change, the only damage found was a slightly bent lower longeron at the forward strut fitting, which has since been modified and improved. Mira Slovak did a wonderful job and so did the Jobmaster."

—T. A.

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LIGHT TWIN VTOL

(Continued from page 35)

gine is made."

In addition to three years of research and design study, Robertson has conducted exhaustive laboratory experiments with electrically-powered models of numerous VTOL configurations and is convinced his M-287 represents the most practical and therefore an attractive design for VTOL aircraft. He has, for example, tested some 320 airfoil and flap combinations.

Among many interesting findings, he says, is the fact that a single- engine VTOL will be practical despite the common but erroneous belief that torque would make it unmanageable at very low speeds. His experiments have proved, he said, that the flap arrangement milks sufficient torque from the rotating slipstream to largely offset the engine torque and directs it downward so that it has insignificant effect on the aircraft fuselage and never actually reaches the empennage or tail surfaces. He has engineering studies on numerous single-engine, twin-engine and four-engine designs which he describes as offering substantial advantages in high speed transportation as well as vertical take-off and landing.

The goal of the Robertson and other VTOL projects is the elimination of large landing areas from the requirements of workaday aircraft, so that city center-to-city-center air travel will become practical. While increasing aircraft speeds with conventional designs demand longer runways and these in turn influence the moving of airports into rural areas at greater and greater distances from city centers, the city-to-airport ground transportation requirements in time tend to offset gains in air speeds.

Helicopter developments have made rotary wing aircraft practical for VTOL operation in city centers but are inherently limited in forward speeds.

Robertson is confident he has a solution but emphasizes that his project is for research only and is not aimed at any specific development of a marketable VTOL airplane having competitive utilization features. The M-287 is purely experimental.

Robertson gained attention in 1954 when he developed the "Skylark," an STOL (for short take-off and landing) light plane featuring high lift devices and very large full-span flaps. He performed this work in the St. Louis area, home of his father's company, the Robertson Aircraft Company, which figured prominently in the Lindbergh saga and other aviation

TILT-WING RESEARCH TRANSPORT FOR VERTICAL TAKE-OFF AND LANDING is being developed by Hiller Helicopters on an Air Force contract. The Hiller X-18 will have less hovering capability but greater forward speed than helicopters. —(Hiller Sketch.)

activities during the 1920's. Young Robertson now has his own company, devoted only to engineering research and development, at Eagle Mountain Air Base, a war surplus field near Ft. Worth, Texas.

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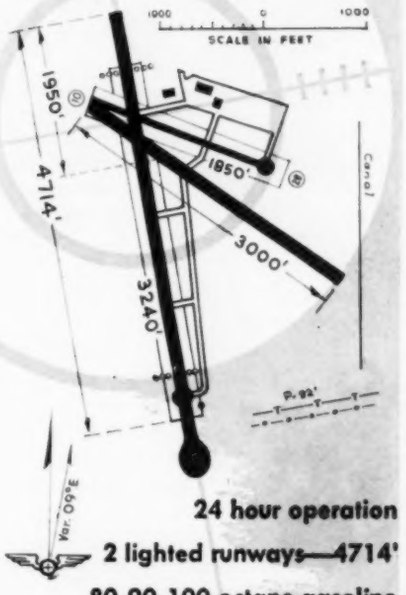

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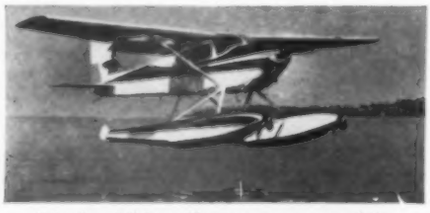

Edo Amphibious Floats are approved for the Cessna 180, the deHavilland Beaver and Otter with only a slight sacrifice in payload and performance—far outweighed by increased utility. Other approvals are pending.

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DE HAVILLAND CARIBOU

(Continued from page 33)

of supplies at a range of 200 miles or more and takes off from unprepared air strips at gross weight without wind in only 655 ft.

"The aerodynamic features which provide short-field performance and low-speed handling qualities of the Caribou are a logical extension of those developed in the Beaver and the Otter," de Havilland explains. "The high performance claims for this airplane are therefore based on known quantities, the effectiveness of which has been demonstrated in service.

"The development of the Caribou has been under consideration for some time. Design studies have been actively under way for the last two years. The decision to proceed with the design and development was arrived at several months ago, when the Canadian Army and the Department of Defense Production indicated they would be prepared to participate with de Havilland in the design and manufacture of the prototype aircraft.

"The first DHC4 aircraft is scheduled to fly by midsummer, 1958. On completion of its civil airworthiness tests, it will be turned over to the Canadian Army for evaluation trials."

★ ★ ★

PREVIEW OF JET TRAVEL

(Continued from page 30)

Then it was flown by with one of the unsuppressed jets operating, the other three being shut down. "Interestingly enough," Tex told us, "we learned we could stabilize the 707 with three engines inoperative at 1,000 ft. and at a 240-knot air speed. This was at a gross weight of 140,000 lbs."

Taking off from Denver the next morning, we were grossing only 160,000 lbs. and Tex "rotated the nose upward" to break ground at 130 knots after using 5,800 ft. of the mile-high runway. At 30,000 ft. we encountered turbulence in clear air and Tex identified it as the shear edge of a jet stream we were entering, smack on the nose. He added power. In its center, the turbulence disappeared and the air was smooth as silk and very cold — minus 65 degrees F. We were at 35,000 ft. and checkpoints revealed the headwind had a velocity of 140 mph. We stayed in it about an hour before our Seattle heading took us out of it, but not without the tell-tale turbulence at its other edge.

Jet streams during the winter and spring are being used more and more by high-flying jets for tail-wind advantages. They meander north and south while blowing from west to

The McCauley Met-L-Prop Fixed-Pitch Propeller is available for Tri-Pacers, Pacers and Super Cubs.

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JUST GOING ALONG FOR THE RIDE, the parasite in the belly of this B-36 is the new Convair B-58 Hustler, supersonic bomber. This was the easiest way to transport the B-58 from the Convair factory in Texas to Wright Field in Ohio for static load tests. Two inboard propellers of B-36 were removed to make room for delta-winged B-58 and B-36 pilot could not retract his gear. Trip was uneventful. —(Convair Photo.)

east and it is difficult to stay within their narrow confines and thin profiles. But Doppler radar is making possible the perfection of ultra-sensitive ground-speed indicators. With these, pilots will stay in the jet stream by flying their ground-speed indicator — as soon as the needle begins the slightest recession, they will maneuver to pick it up again, thus hanging on for maximum benefits.

Despite the fact that our hour of jet stream had slowed us down, our time over the 1,055-mile distance was only 2 hrs. 10 mins. for 486 mph. But rain and heavy cloud at Seattle required another instrument approach and this added 29 mins. to our time. Fuel consumption was 34,000 lbs.

From operating figures given, we calculated the 707 prototype averages 1,900 to 2,000 gals. of fuel per hr. on a block-to-block basis, including taxi, take-off, climb, cruise, descent and landing. This compares with 360 gals. per hr. for the DC-6 and 560

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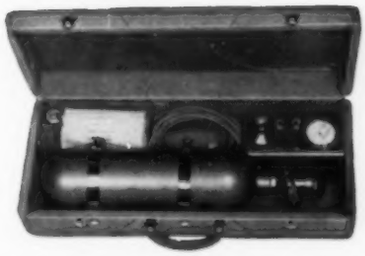
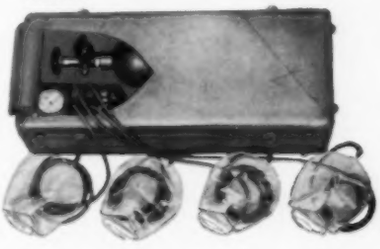


Below — Case closed, hatch open for use with Scott K-S disposable masks.



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BILL PIPER HAS MADE THE BIG-TIME, the occasion for this photo being his presence on Wall Street for the first transaction of Piper Aircraft Corporation trading on the New York stock exchange. Holding the tape with W. T. Piper, Sr., (left) is Keith Funston, president of the exchange. Behind them, left to right, are Tom Piper, vice president-operations, W. T. Piper, Jr., executive vice president of the 29-year-old firm which made the Cub famous, and Howard Piper, vice president-research.

gals. per hr. for the DC-7, block-to-block.

Yet economy of operation, which means superior revenue earning potential, is the basis for 707 sales which already total more than 140 planes at over $5 million per copy. The Boeing figures are interesting. While the 707 has a direct operating cost of less than 1.4 cents per seat mile as compared to 1.8 cents for current long-range piston transports, the 707 work rate — the number of seats multiplied by the average speed — is about 3.5 times as great for the 707, which will carry up to 131 first-class passengers as compared to 58, 60 and 67 first-class passengers in piston transports.

It all adds up to mean that only 9 Boeing 707's are capable of offering the same number of seat miles as 25 of today's latest transports. These 9 jets will operate at a savings of $11 million annually over the 25 slower transports — when all indirect and direct operating costs are considered (including reduced ground facility requirements for the fewer jets). Boeing adds: "The 707 transports can operate with greater economy than present transports on the same routes, using the same airports."

Nearly one billion dollars worth of orders indicate that the airlines agree with Boeing — Pan American, American, Braniff, Continental, TWA, Qantas, Air France, Sabena, Lufthansa, Air India and BOAC.

INTERESTING SIDELIGHTS: The 707 prototype made its first flight on July 15, 1954. Since then, it has logged about 710 hrs. on more than 500 flights. . . . The prototype has a zero fuel weight of about 100,000 lbs. and grosses 190,000 lbs., with 12,000 gals. of fuel in the wings. Dimensions include 130-ft. wing, 128-ft. length and 38-ft. height. Wing sweepback is 35 degrees. Wing area is 2,500 sq. ft. Production 707's will be the Series 120, 220 and 320. The 120, with four J-57's of 12,000 lbs. thrust each, will gross 240,000 lbs. and its payload will be 31,000 lbs., leaving some 100,000 lbs. for fuel—an all-out range of about 8 hrs. The large Series 320, with four J-75's of undisclosed but much more power than the J-57's, will be a larger transport with 141-ft. span, 146-ft. length, a 280,000-lb. gross and a 35,000-lb. payload. Cruising speed for all three versions will be the same — 550 to 600 mph. These weights compare with 25,000 lbs. gross for the DC-3, 46,800 lbs. for the Convair 340,

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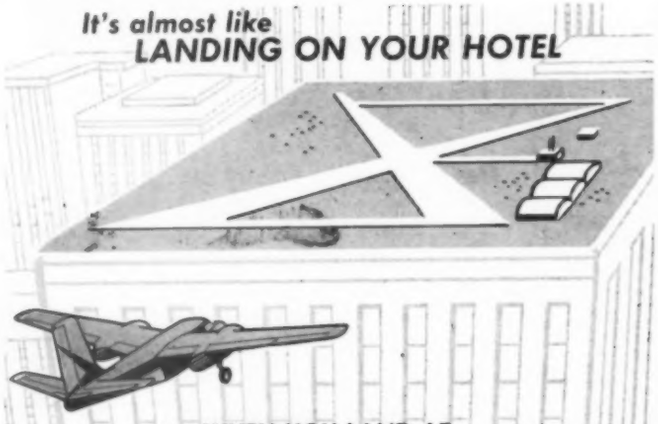

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AIRCRAFT RADIO CORPORATION'S Twin-Bonanza is seen nowadays at many airports. Here it is in Houston, Texas, with Ken Faulkner (left), owner of Faulkner Air Radio, welcoming ARC representatives Sid Meacham (center) and Rock Leone. (Faulkner Air Radio Photo.)

75,000 lbs for the DC-4, 107,000 lbs. for the DC-6B and 145,000 lbs. for the DC-7C and Boeing 377.

Keys to development of the big jet airliners were (1) availability of J-57 and more powerful engines; (2) pod engine mountings, a Boeing invention which made possible more wing fuel storage, and (3) fuselage housing of the large landing gear, which made possible still more wing fuel storage.

Cabin pressurization differential in the 707 is about 8.4 to 1 — sea level cabin pressure can be maintained up to about 25,000 ft.

Boeing charts picture take-off distance requirements, based on Air Transport Association factors, as averaging about 6,000 ft. for the Series 120 up to loading for a 2,000-mile stage length, the distance going up to 7,800 ft. for 3,500-mile stage length, and about 6,000 ft. for the J-75-powered versions up to loading for 3,500-mile stage length, after which the take-off distance increases with loads for longer hops, being about 8,000-ft. for stage length of 4,500-miles. These requirements are for sea level and standard air and include clearing a 50-ft. obstacle. They are based on full revenue loads of 124 passengers for the 120 and 220 and 131 passengers for the 320.

Current model J-57 engines accelerate from idle to 100% rpm. within 4.5 to 5 seconds, which is about the same as for large piston engines. Time between overhaul is currently about 600 hrs. and increasing for the J-57, which is less than half of that for large piston engines. The J-57 has no restrictions against throttle jockeying, as did earlier jets—throttles can be opened or closed at will. Water injection will probably be standard procedure for jet transport operations in hot weather take-offs.

The first 707 delivered to an airline will go to Pan American in late 1958. American Airlines will receive its first 707's early in 1959. . . . The Air Force has already received its first KC-135 jet tankers, which are basically the same airplane as the 707. These are dual-purpose airplanes, all of the tanker fuel being carried in fuselage tanks beneath the cabin floor. No conversion is necessary to use the tanker as a transport—its cabin resembles that of the 707, without plush.

Some 400 J-57 and 1,300 J-75 jet engines are on order to power Boeing 707 and Douglas DC-8 jet airliners. Over 7,000 J-57's have been produced since 1953. By the end of 1958, the J-57 will have accumulated over 4,500,000 operational hours, the J-75 approximately 350,000 hours.

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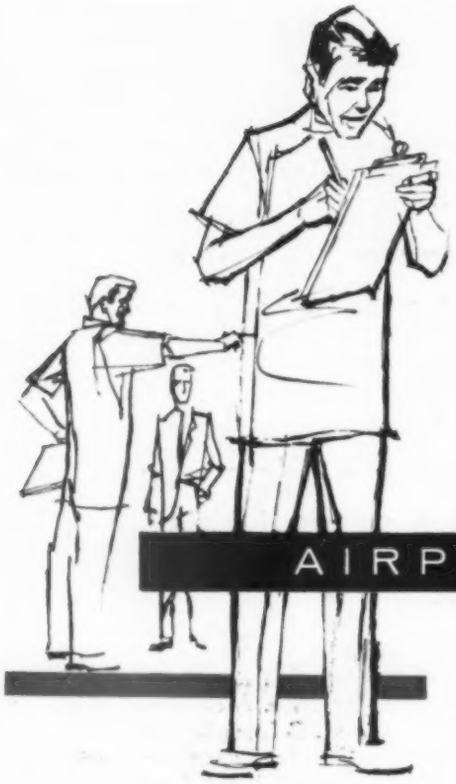

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